Catalog

1 Overview

1.1 Introduction to WSS Cloud Engineering Survey

INTELBRAS cloud engineering survey is a cloud engineering survey simulation software launched by INTELBRAS , which greatly saves the manpower and material resources during the on-site engineering survey of wireless projects.

Through the mapping of the wireless project site environment by engineers, INTELBRAS cloud engineering survey can intuitively view the coverage effect of WLAN on the site and generate engineering survey map, which greatly improves the efficiency of wireless project site engineering survey.

The core of INTELBRAS cloud engineering survey is to render the coverage intensity range of AP (wireless access point) and generate engineering survey map by simulating the environment. All the functions are to generate more accurate cloud engineering survey map. AP (wireless access point) is divided into installation type, outdoor type, x-share, panel type. The type and thickness of the obstacle can be set, and the attenuation of the obstacle to the wireless signal can be checked. When new engineering survey map is built, the corresponding industry and environment can be selected. The system is built into 9 major industries and 27 kinds of environments, which fully supports the engineering survey needs of various industries and environments, and supports the user-defined environment, making it more flexible and convenient. The system built-in INTELBRAS common AP model, which can meet most of the use cases. At the same time, it supports the addition of an AP model that is not preset in the system, and the existing AP model supports the modification of the transmission frequency. Users can view the simulation diagram, weak field diagram and point bitmap according to their needs, and quickly understand the required material model and quantity through the bill of materials and engineering survey report of the whole project, as well as whether it can meet the signal requirements.

1.2 WSS cloud engineering survey service capabilities

With the continuous development of the Internet, users' demand for wireless network access is also increasing. The performance of wireless products has been greatly improved, but there are still bottlenecks in some special situations. In addition to the technical evolution of wireless products, engineering survey is particularly important to solve these issues.

During the project implementation process, using cloud engineering survey tools will shorten the project implementation cycle, reduce the AP (Access Point) point error and the error rate after real deployment, and provide customers with a high-quality wireless signal coverage network experience. Considering to ensure the wider coverage of INTELBRAS wireless networks and giving full play to the performance advantages of INTELBRAS wireless network equipment, INTELBRAS launched the WSS Cloud Engineering Survey. The tool can simulate a variety of wireless coverage application scenarios, and through simulation surveys to meet customers' wireless network coverage requirements.

By importing engineering pictures in jpg, bmp, or png formats, one-click simulation deployment, accurate AP deployment planning, and transparent presentation are organized. Regarding the quality of wireless coverage signals, by simulating obstacles (walls, glass, and other media) and attenuating the wireless signal, turning on the wireless AP scene coverage mode,you can clearly simulate the signal effect of the wireless AP after deployment. Regarding the signal dead zone, the correction effect can be guaranteed by subtle correction. The flexible output report effectively supports the communication between engineers and customers on how to optimize the network scenario design for high-density and high-traffic complex scenarios.

INTELBRAS WSS Cloud Engineering Survey (Wireless Site Survey) is launched for the deployment of INTELBRAS wireless AP. It provides effective AP deployment, engineering survey simulation, and solution planning effect output with minimal time and easy operation, which reduces the complexity of operations, concise and efficient deployment and maintenance of wireless networks.

INTELBRAS WSS cloud engineering survey simplifies wireless network deployment,check wireless signal coverage, and gives users a good access experience, effectively solving wireless networks problems such as poor coverage quality and unsatisfactory Internet speed experience due to incomplete survey and deployment.

- Cloud engineering survey is an important part to ensure the experience of wireless network delivery;
- Use tools to simulate the customer's environment, submit engineering survey reports to customers in conjunction with on-site surveys, and provide suggestions on the number of equipment and auxiliary materials to ensure customer experience;
- Software simulation is required in the engineering survey report to support the survey report data.

1.3 Tool Interface Layout

Main page

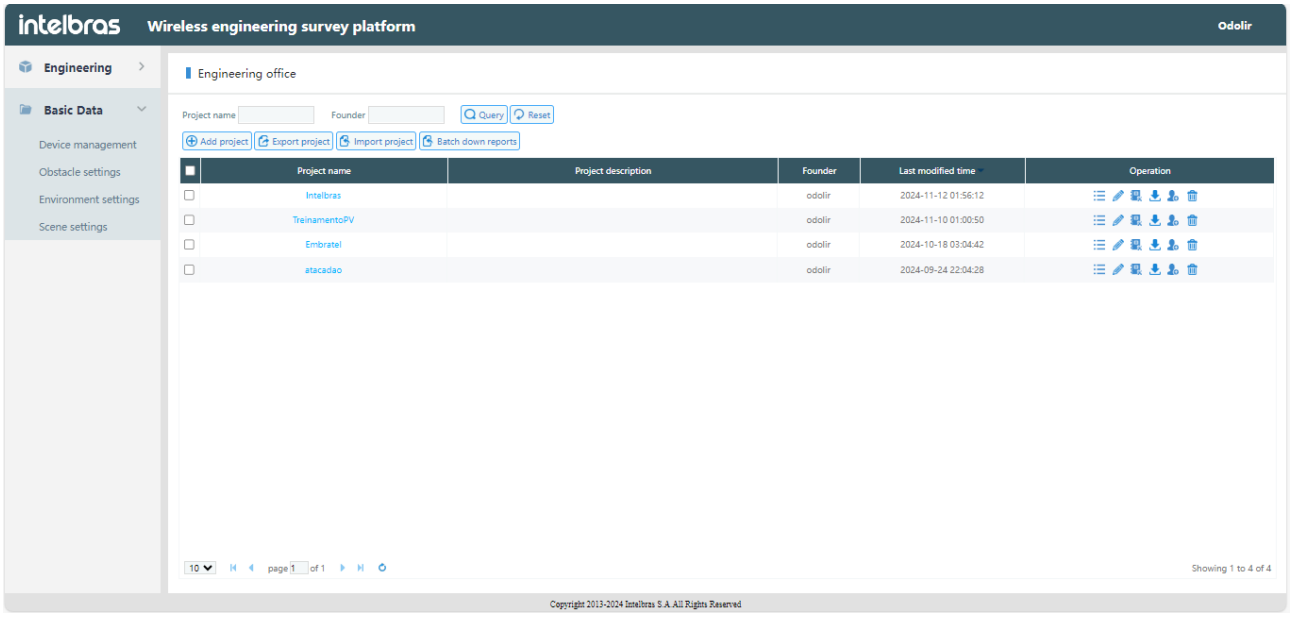
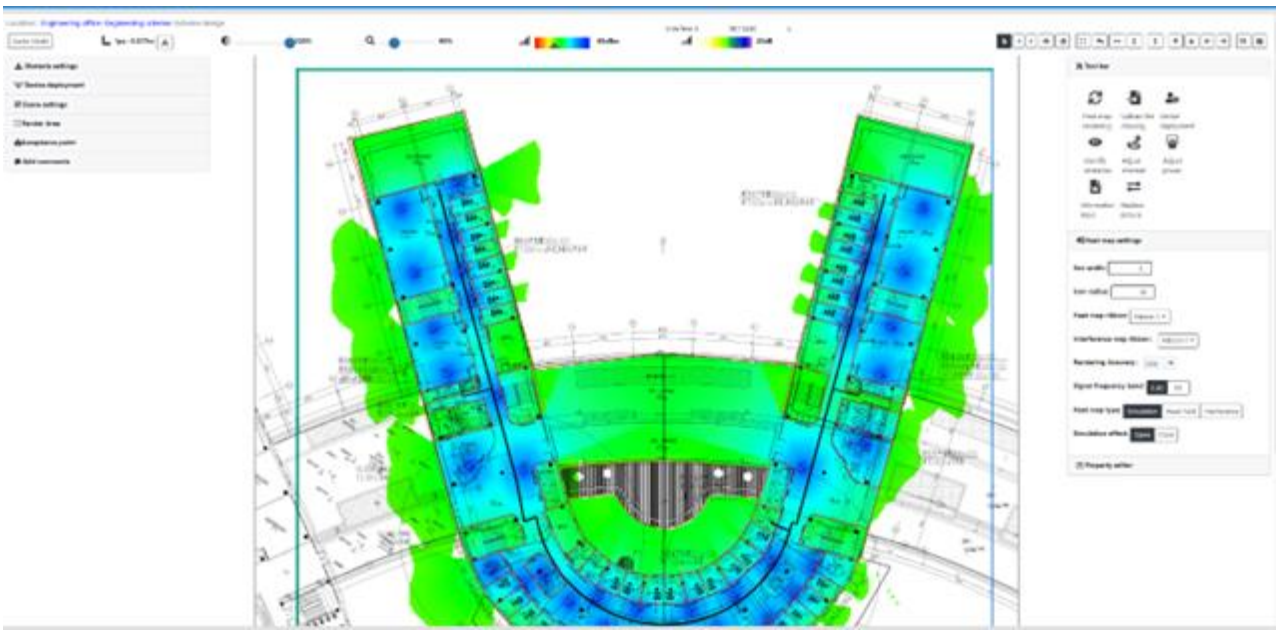
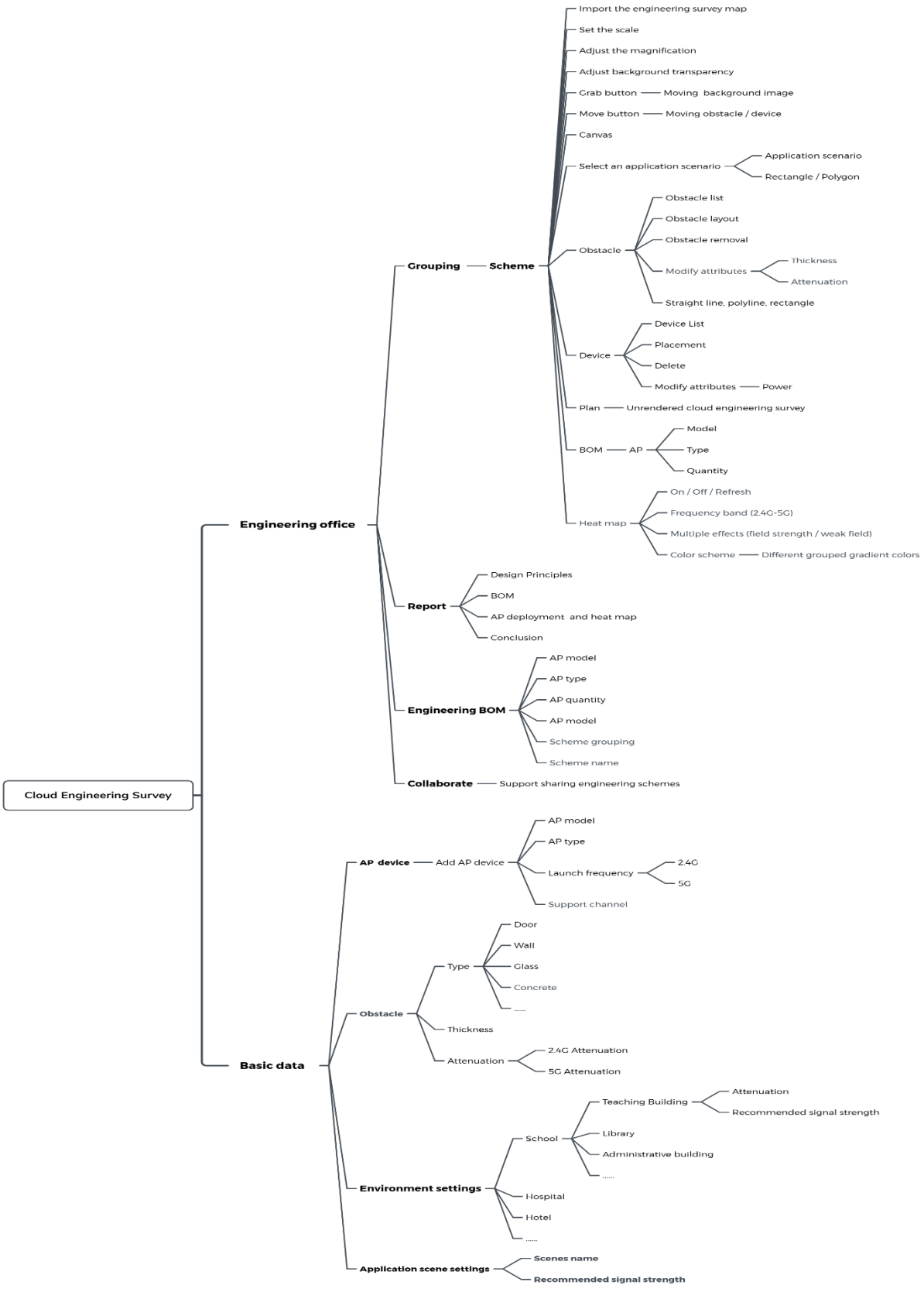


Figure 1-1 Rendering page



- Project management: It can manage projects and schemes, draw engineering survey drawings, view renderings, bills of materials, and download engineering survey reports.
- Rendering area (scheme designer): The scheme designer is the core function of the cloud engineering survey tool. It is used to draw engineering survey maps, and generates simulated signal simulations by combining obstacles, APs, and scenes.
- Basic data: Basic setting area. User-defined additions and modifications for basic parameters, including AP devices, obstacles, environments, and application scenarios.

1.4 Overview of WSS Cloud Engineering Survey Composition



2 Engineering management

Engineering Management Includes the main functions of cloud engineering survey tools: engineering office, engineering bills of materials, engineering schemes, project collaboration, scheme results, scheme designers.

2.1 Engineering Office

2.1.1 Project List

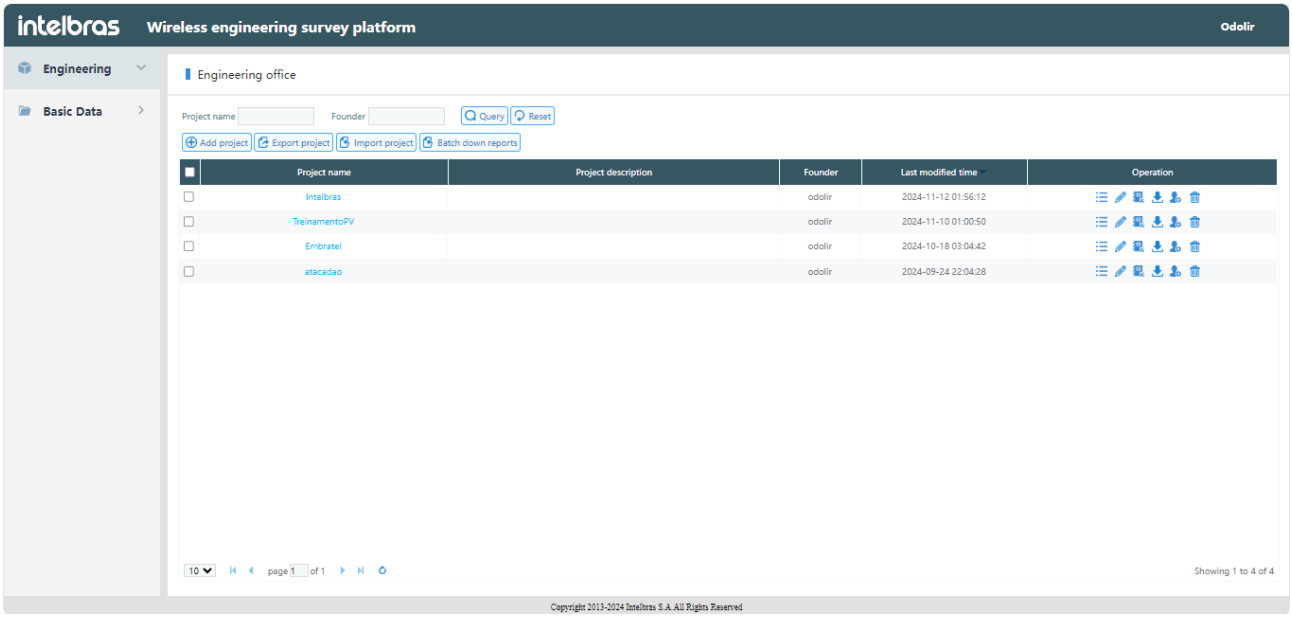
Pagination display: project name, project description, creator, last modification time, operation (view project plan, edit project information, project bill of materials, download report, collaboration, delete).

Explanation:

By default, the list is displayed in order of project creation time.

Log in to the INTELBRAS WSS Cloud Engineering Survey, select the [Project Management] menu item in the left navigation, and enter the engineering office page, as shown in the figure below.

Figure 5-1 Engineering office



2.1.2 Query Bar

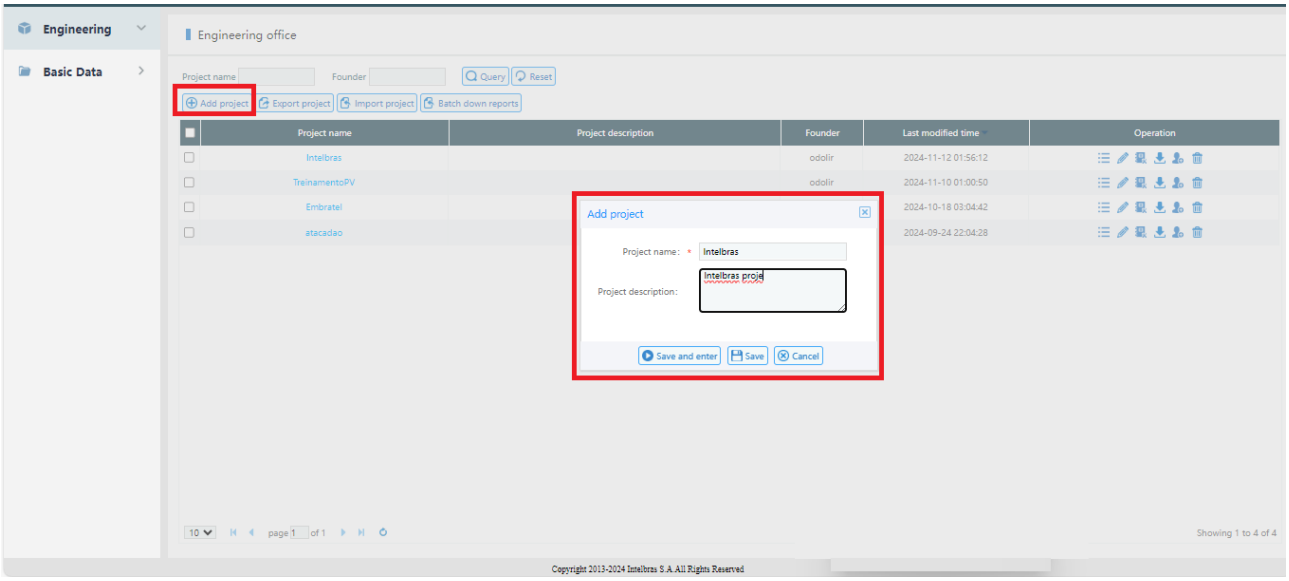
Engineers can enter the project name, creator, and search for the desired project (fuzzy search by defaulit).

2.1.3 Add Project

(1) Click the <Add Project> button. A pop-up window for adding a project is displayed. Enter the project name and project description.

(2) Click <Save and Enter> to complete the project addition and enter the project plan page of the engineering office.

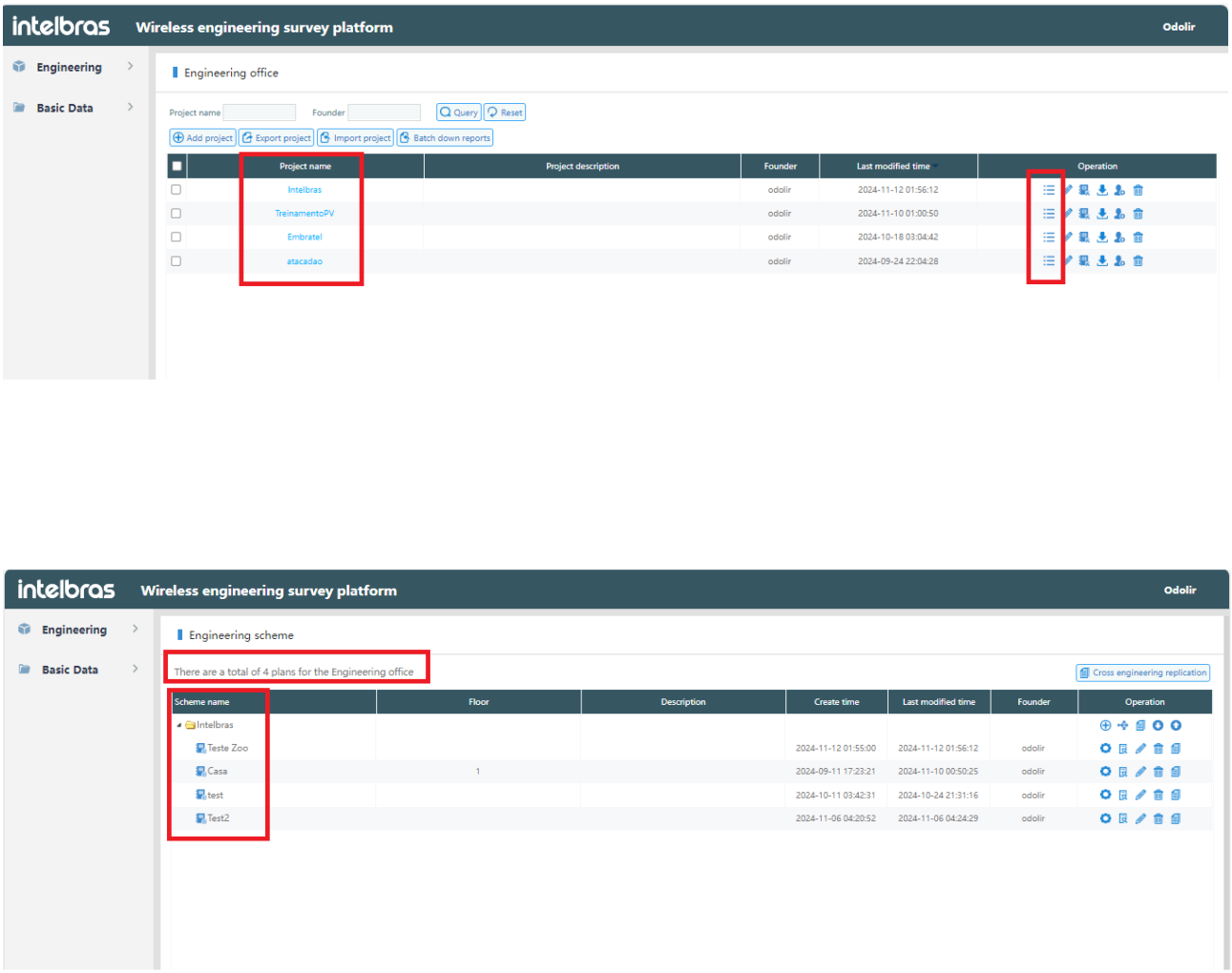
Figure 5-2 Adding a project



2.1.4 Engineering shortcuts

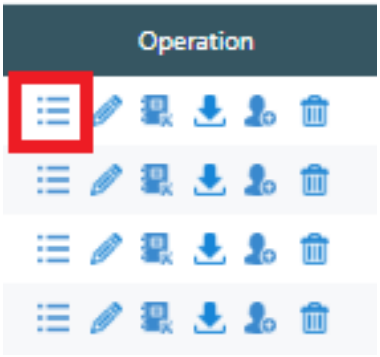
(1) In the project list, click the corresponding "Project Name" to turn to the [Project Scheme] page of the corresponding project.

Figure 5-3 Engineering solution portal



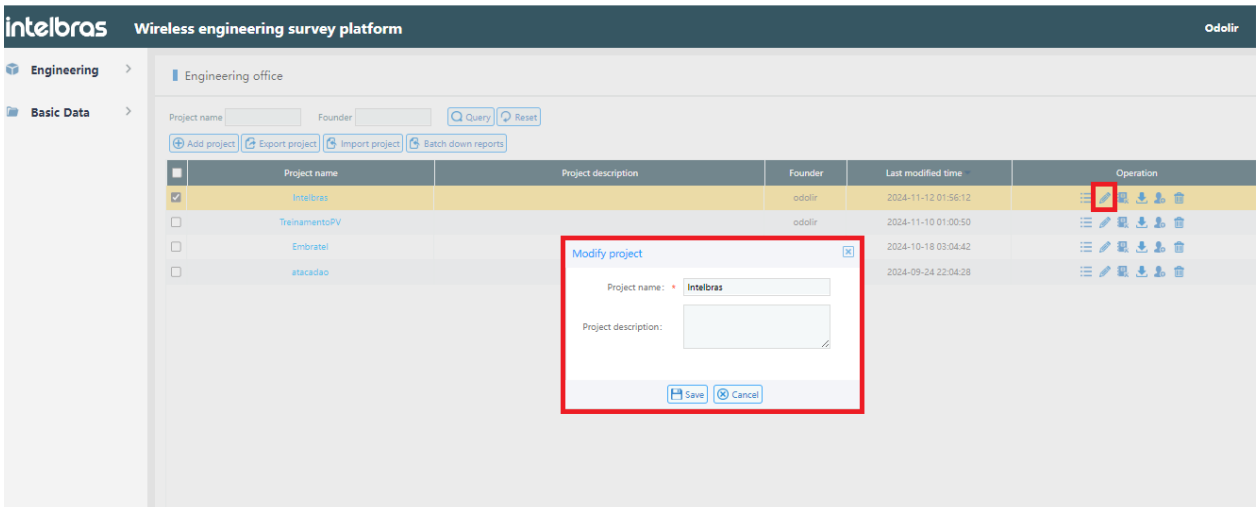
(2) View project plan button: Click the button to turn to the [Project Plan] page of the corresponding project.

Figure 5-4 View project plan



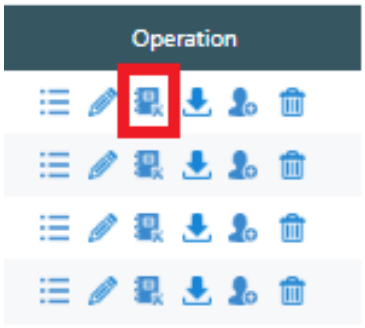
(3) Edit project information button: Click the edit button to pop up the Modify Project window to modify the project name and project description.

Figure 5-5 Editing the project plan



(4) Engineering BOM button: Click the button to turn to the [Engineering BOM] page.

Figure 5-6 Engineering physical inventory



Engineering BOM

AP model	AP type	AP number	Scheme grouping	Scheme name	Note	Operation
RW 6181	Placement	1	Intelbras	Casa		
AP 5620XDE	Placement	1	Intelbras	test		
AP 3620X	Placement	2	Intelbras	Test2		
RW 6302	Placement	2	Intelbras	Casa		
AP 5620	Placement	1	Intelbras	test		
AP 7739	Placement	1	Intelbras	test		
RW 6181 AP 7739	Placement	2	Intelbras	test		
AP 5626	Placement	1	Intelbras	Teste Zoo		
AP 3622	Placement	2	Intelbras	test		

(5) Download report: Click the button to download the report of the corresponding project. The customization of report content elements is supported,which contains five modules: basic information, design principles, bill of materials, AP deployment location, interference map , heat map and conclusion.

Figure 5-7 Download report

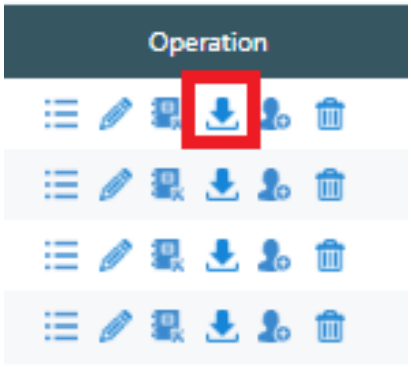


Figure 5-8 Report content customization

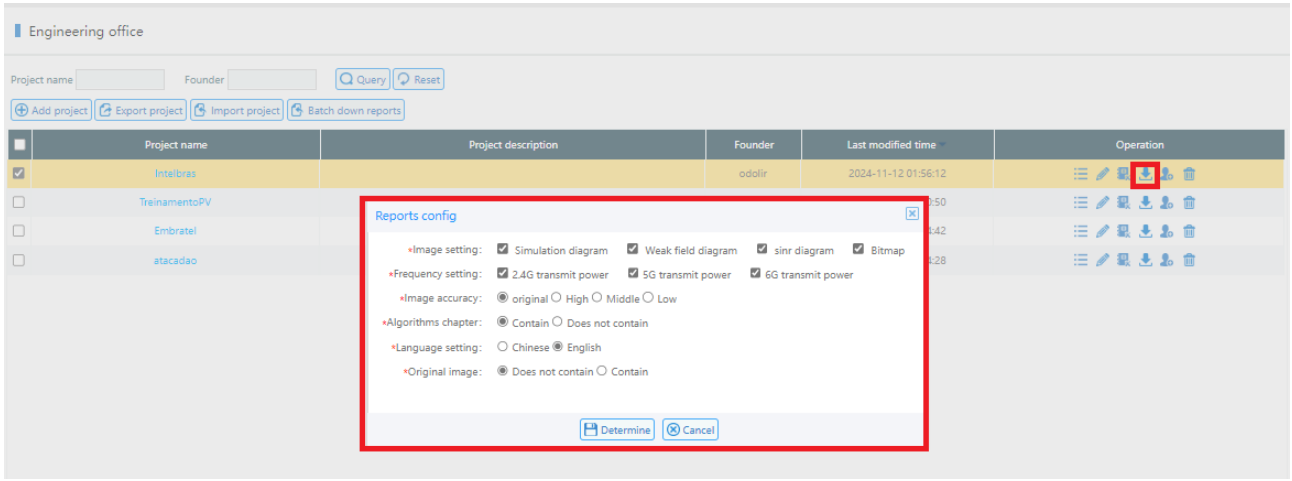

Engineering office
Project name
Founder
Query
Reset
Add project
Export project
Import project
Batch down reports
Project name
Project description
Founder
Last modified time
Operation
Intelbras
odolir
2024-11-12 01:56:12
TreinamentoPV
Embratel
atacadao
Reports config
*Image setting:
Simulation diagram
Weak field diagram
sinr diagram
Bitmap
*Frequency setting:
2.4G transmit power
5G transmit power
6G transmit power
*Image accuracy:
original
High
Middle
Low
*Algorithms chapter:
Contain
Does not contain
*Language setting:
Chinese
English
*Original image:
Does not contain
Contain
Determine
Cancel

Figure 5-9 Sample report

WLAN Wireless Network Engineering Survey Design Scheme

Intelbras

2024-11-20

2 Overview of wireless engineering survey of Intelbras

2.1Wireless network coverage

2.2Material checklist

Wireless Engineering Survey Result (Wireless device statistics)								
Building information	Floor information	Deployment plan	AP model	Quantity	Antenna model	Quantity	Feeder model	Quantity

Total (list of wireless devices)		
Device model	Quantity	Remarks
AP 3620X	2	
AP 3622	2	
AP 5620	1	
AP 5620XDE	1	
AP 5626	1	
AP 7739	1	

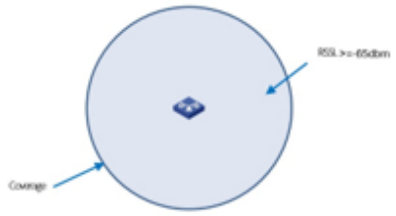
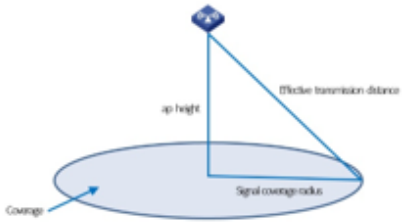


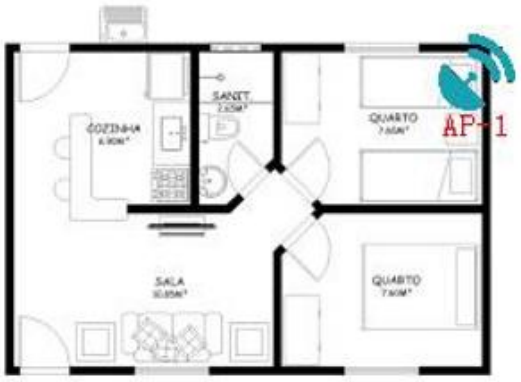
Figure 3.1

3.1.2Coverage radius

For AP with omnidirectional antennas, the coverage radius is usually used to indicate the signal coverage area. Take an indoor ceiling-mounted omnidirectional antenna AP as an example, when the installation height of the AP is known, the effective transmission distance is calculated in reverse according to the edge signal strength of the effective coverage (generally -65dbm), the coverage radius can be calculated according to the Pythagorean theorem, which is what we call coverage. Refer to section 3.4 for the calculation method of effective transmission distance.

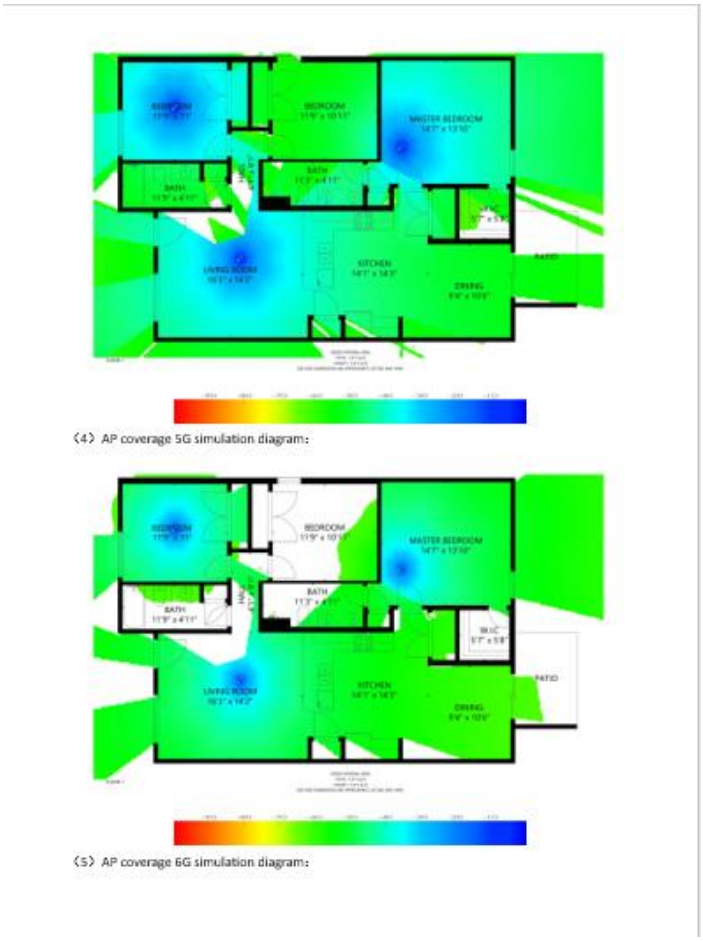


〈2〉 AP deployment point bitmap and device list



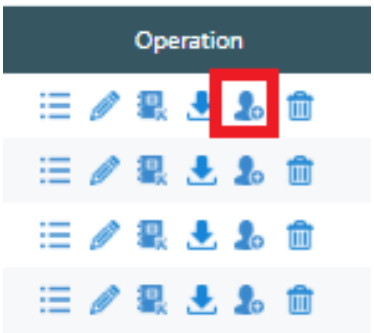
Coverage area	Floor	AP model	AP name	AP deployment location	5G transmit power	2.4G transmit power	Radio1	Radio2	Radio3
Teste Zoo		AP S626	AP-1		20	20	36	1	N/A

〈3〉 AP coverage 2.4G simulation diagram:



(6) Collaboration button: Click the button to pop up the [Collaboration] window. One project supports multiple people to cooperate and complete at the same time. It is necessary to add a collaborative person (the user name of the cloud-net account). After the addition is successful, the corresponding person can perform corresponding operations on the collaborative project.

Figure 5-10Collaboration

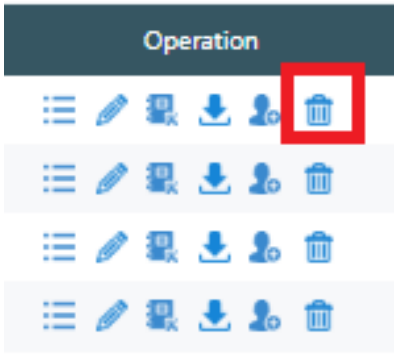


(7) Delete project button: Click the button to delete the corresponding project. It cannot be deleted when a scheme exists in the project. If the collaborator deletes the shared project, it is equivalent to actively disassociating the project from itself.

Explanation:

If there is an associated engineering scheme with current scheme, it cannot be deleted.

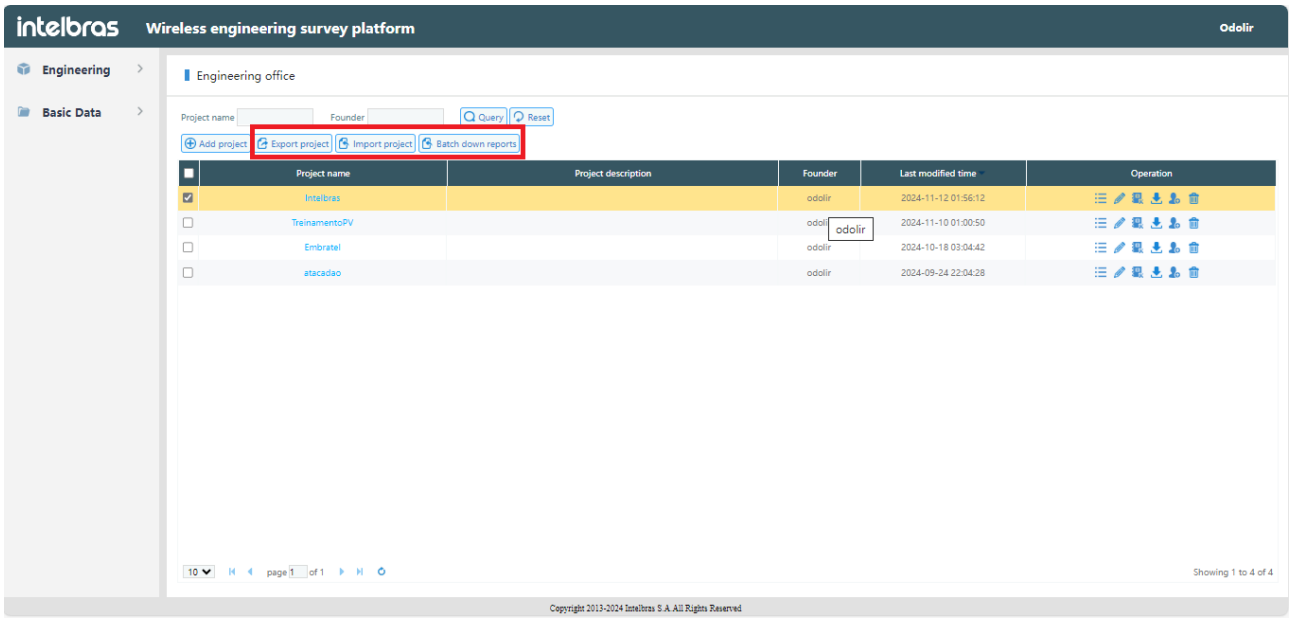
Figure 5-11 Delete project



(8) Export project: The project supports export and also supports batch export of multiple selected projects. It is used to connect cloud-net data with local cloud-net data. Collaborative users cannot export projects created by other users.

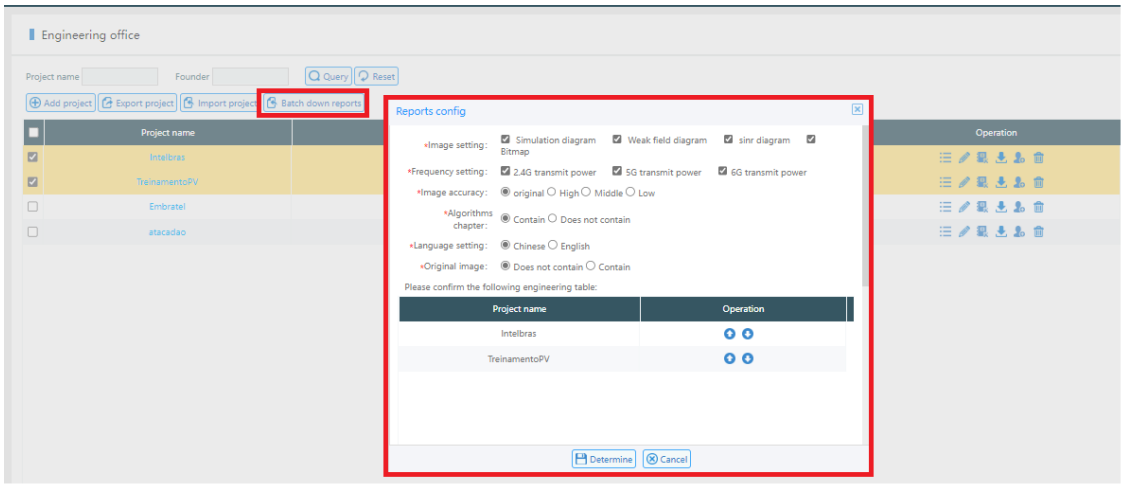
(9) Import project: It supports importing projects exported by other users to the current user. After importing, the project becomes a project created by the current user, and the contents of modification or deletion can be viewed normally.

Figure 5-12 Export and import project



(10) Batch download report: Support unified download of multiple project reports to generate a site survey report. Multiple projects can set project sorting and generate reports according to user-defined sorting.

Figure 5-13 Batch download report



2.2 Engineering BOM

The BOM of the project displays the AP equipment required by the dimension of the project. By default, the AP model, type, and quantity required for each project are displayed.

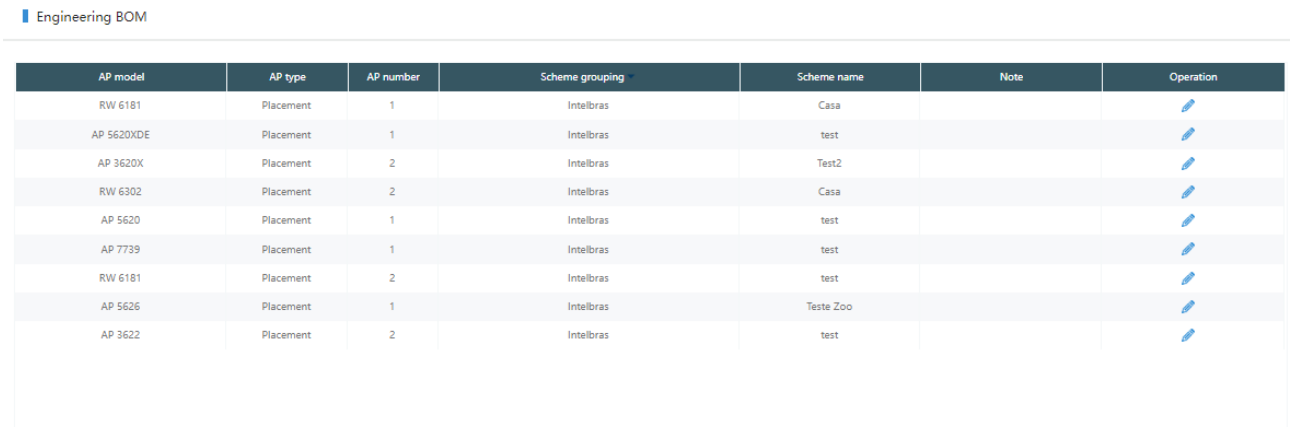
2.2.1 List

List display: AP model, type, quantity, scheme grouping (if it is a multi-level grouping connected with "-" according to the hierarchical relationship, such as: dormitory building-20), scheme name (the scheme name of the AP equipment), remarks, action (you can edit button but only edit notes).

(1) Log in to the INTELBRAS WSS Cloud Engineering Survey, and select the [Project Management] menu item in the left navigation to enter the engineering office page.

(2) Click the Engineering BOM icon in the corresponding operation column of the project to turn to the Engineering BOM page.

Figure 5-14 Engineering BOM page



2.2.2 Modifying Materials

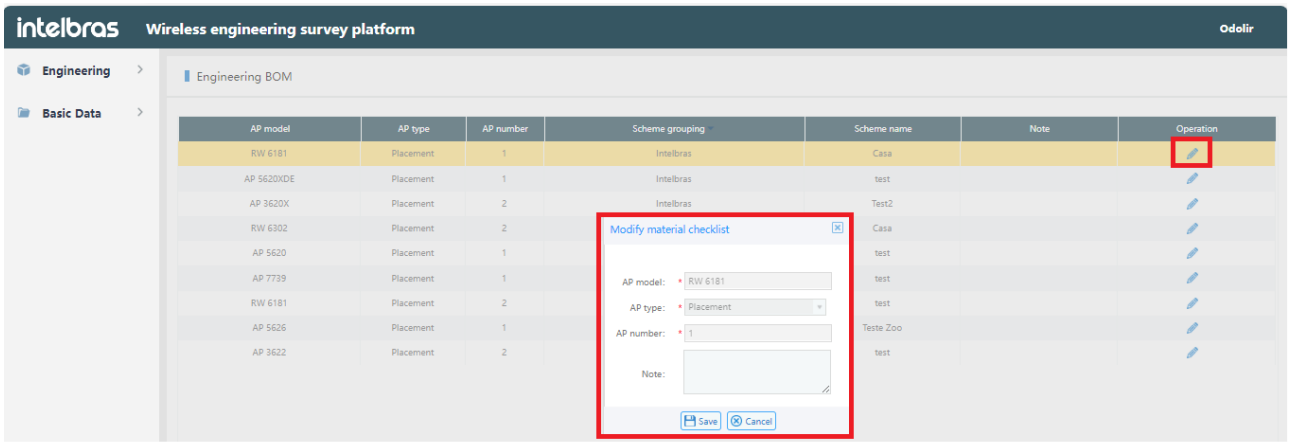
Explanation:

- The column edit button can only edit the remarks.

(1) Click the edit icon in the action bar to pop up the Modify Material window.

(2) Modify the remark information.

Figure 5-15 Modifying material notes

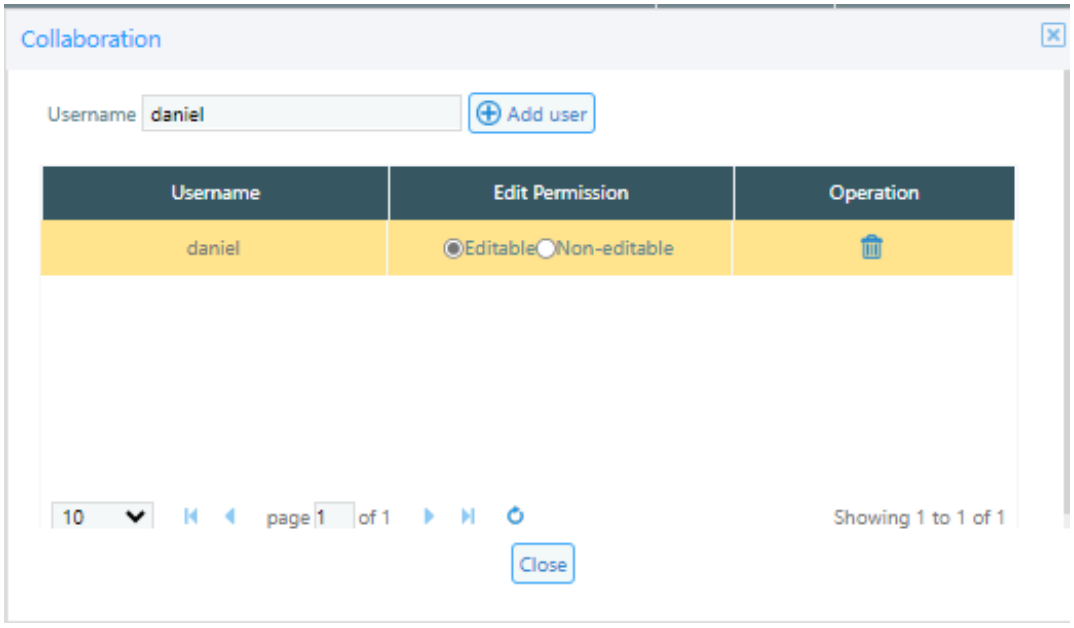


2.3 Collaboration

(1) Log in to the INTELBRAS WSS Cloud Engineering Survey, and select the [Project Management] menu item in the left navigation to enter the engineering office page. You can view the number of projects and the list of projects in the engineering bureau.

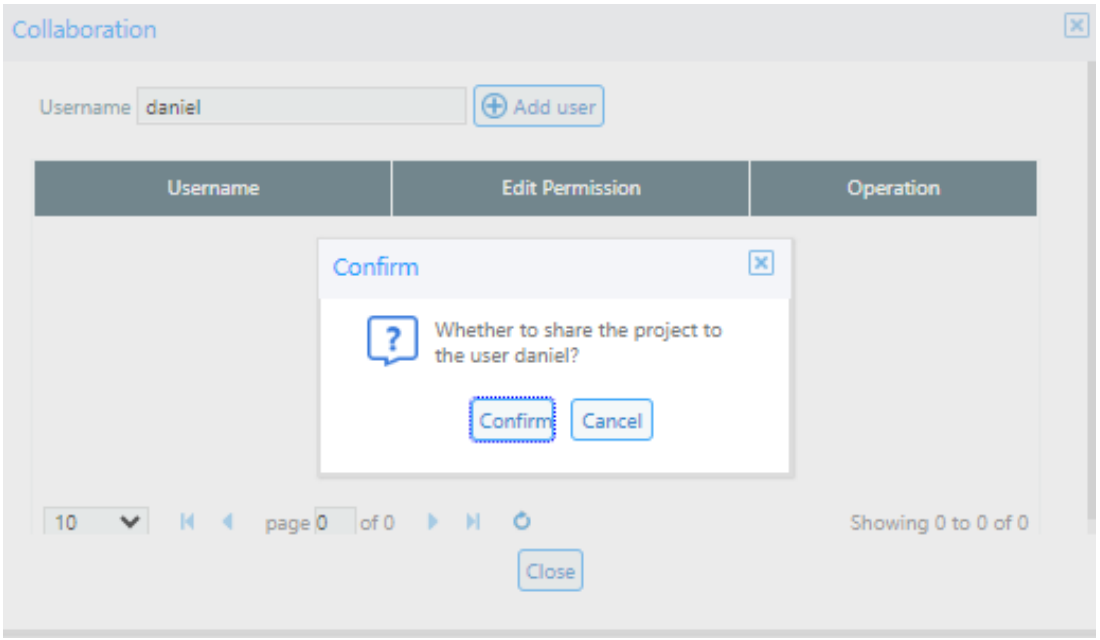
(2) Click the collaboration icon in the corresponding operation column of the project to turn to the [collaboration] page.

Figure 5-16 Collaboration



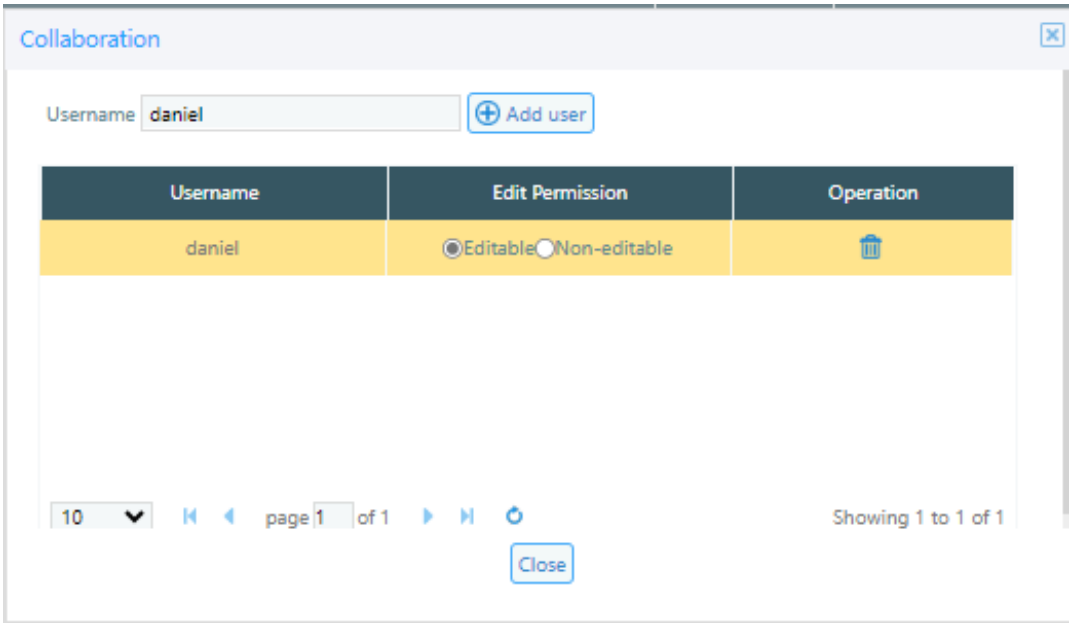
(3) Add user: Enter the user name and click the <Add User> button. If the user name exists, a confirmation option will pop up. If it does not exist, it prompts that: the user does not exist, please enter the correct user name.

Figure 5-17 Adding users



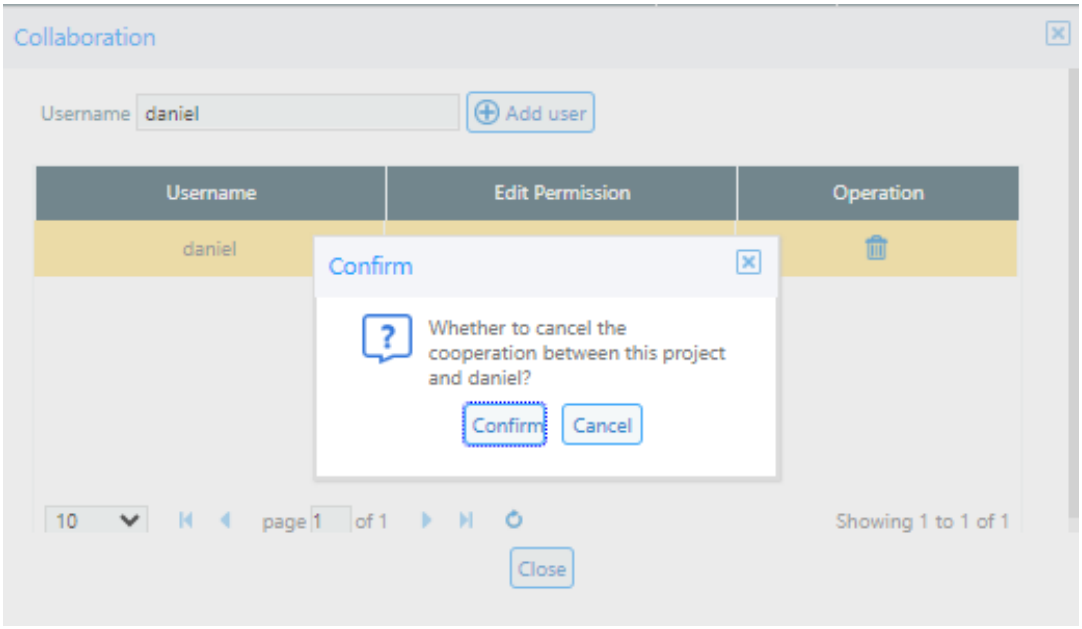
(4) List: The list contains the user name and operation bar (disassociation), and a list of users associated with the current project. The same project supports to cooperate to complete a project at the same time, and it is necessary to add cooperating personnel. After the addition, the corresponding personnel can perform corresponding operations on the collaborative project.

Figure 5-18 User list



(5) Click the disassociate icon in the operation bar to disassociate the associated user from the project.

Figure 5-19 Disassociate

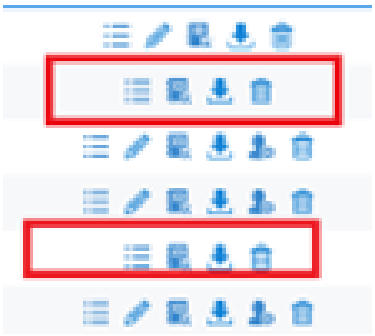


2.4 Introduction to Collaborative Applications

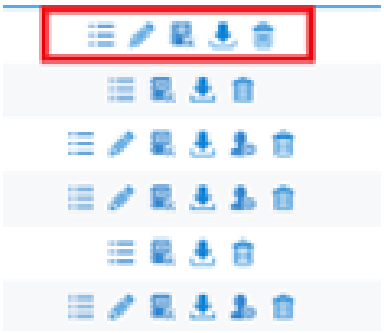
- When a project is coordinated and collaborated (the project is created by employee A, and collaborators B and C are created at the same time), the collaborators (collaborators B and C) have the limited authority to collaborate on the project.

- If the editing right is given to the partners (employees B and C), the project name and project description can be modified. Otherwise, the project information cannot be edited and the project bill of materials can be viewed. The project report can be downloaded, but the collaboration function does not show the partners (employees B and C are not allowed to use the new collaborator function, that is, to create a new collaborator). The deletion of a cooperative project by a partner is to remove the collaboration, and will not delete the project of the creator.
- The partner (employee B and C) will display the Modify button dynamically according to whether they have edit permission. The partners (employees B and C) can not delete, modify, or design the solution created by others. The specific solution partner can only view the solution results, and the other buttons are hidden.
- The permission of the partner on the project site page: if the creator gives editing permission, he can edit the project information, view the project scheme, project bill of materials, download the report, and disassociate (by clicking the delete button, the partner passively disassociates the related project, but it will not affect the display of the project on other people's pages) .

No edit permission:



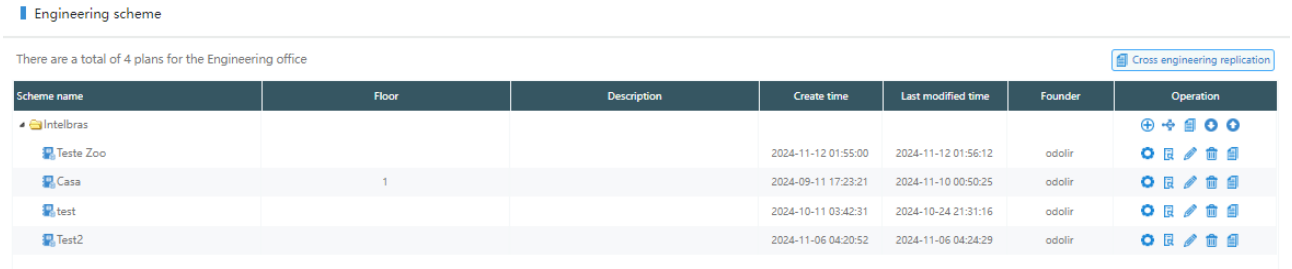
Have edit permission:



The authority of the collaborator on the project site page:

(1) The project was created by the user himself: the user has all rights to edit, modify, and delete schemes and groups created by partners.

(2) The project was created by someone else, and the user is a collaborator: the user has rights to the root node and the group of the project (you cannot delete a group when there is a solution under the group), and you have only the permission to view the results of the solution, and the other buttons are hidden.

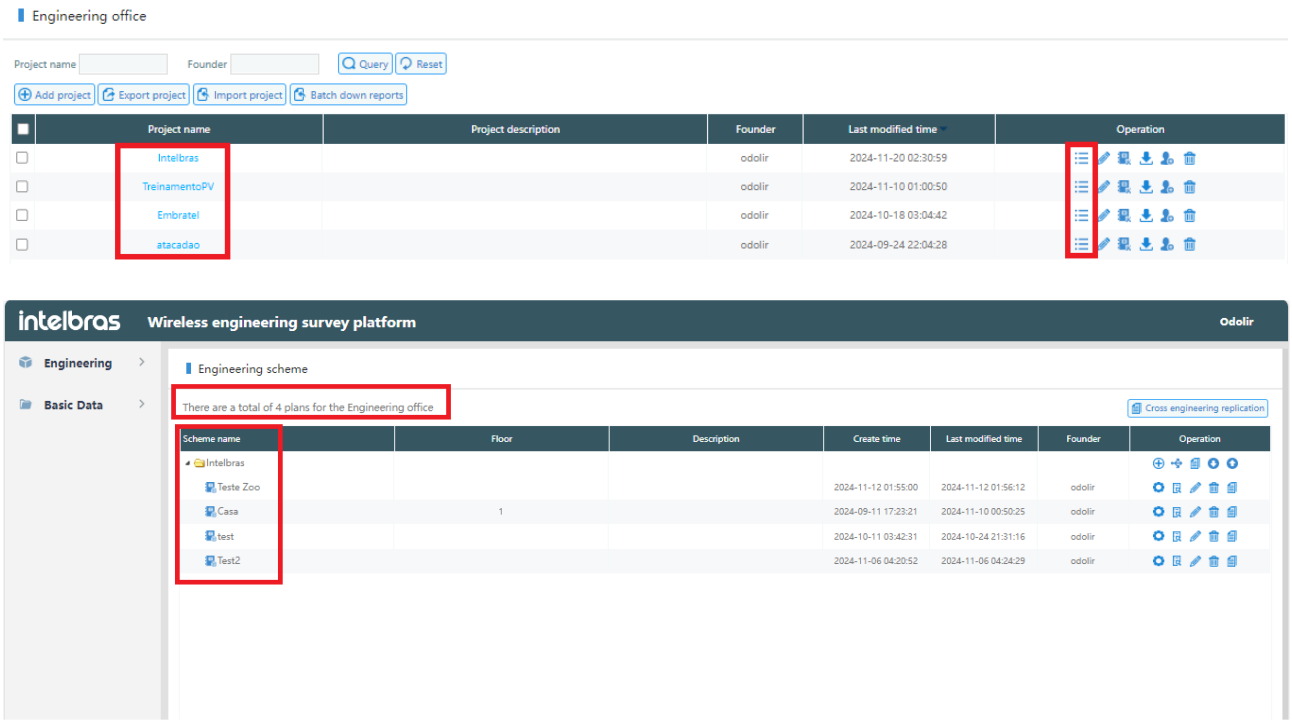


2.5 Engineering scheme

The project solution can be managed through the engineering solution, including adding, deleting, modifying, and viewing functions.

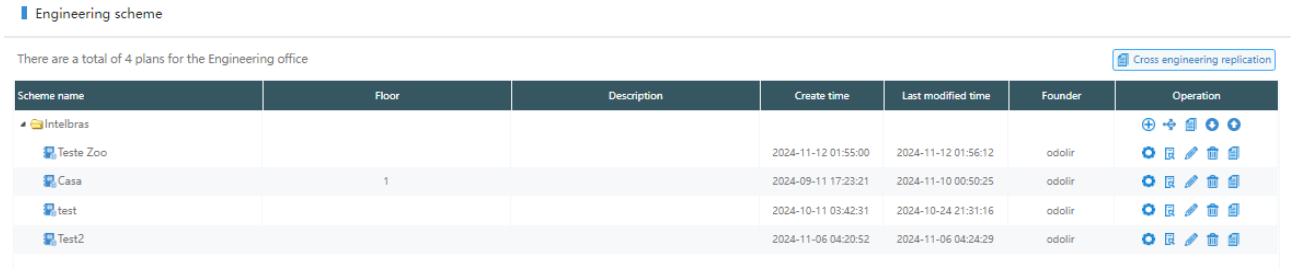
(1) Click the "Project Name" on the project site page or view the project plan button to turn to the project plan page. You can view the number and list of project site schemes.

Figure 5-20 Entering the project plan page



(2) Scheme list: Show scheme name, description, create time, last modification time, creator, operation.

Figure 5-21 Project plan list

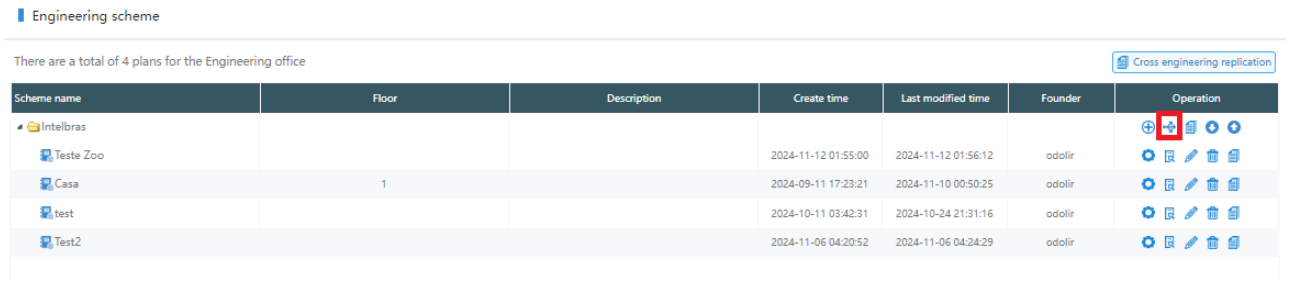


Explanation:

Scheme name: The scheme name is displayed hierarchically in a tree structure. The root node is the name of the engineering office, which can be grouped by multiple levels. There can be schemes under the engineering office and the grouping but no grouping or scheme under the project scheme of the newly-built project site.

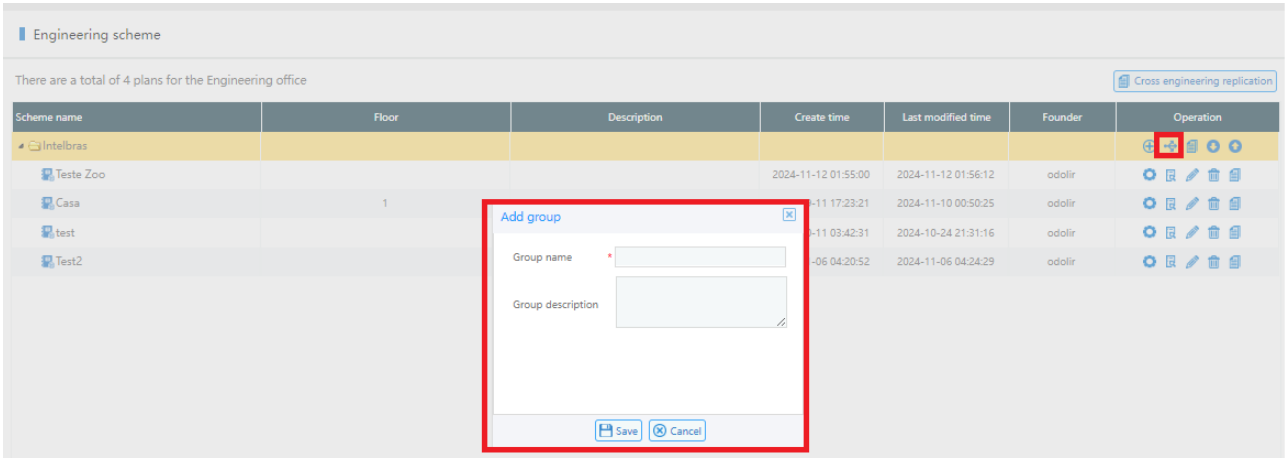
(3) Adding a group: You can add a group directly under the engineering office, or you can add a group under the group. There is no upper limit on the group level.

Figure 5-22 Adding a group



Click the Add button to pop up the Add Group window, and input the group name and group description.

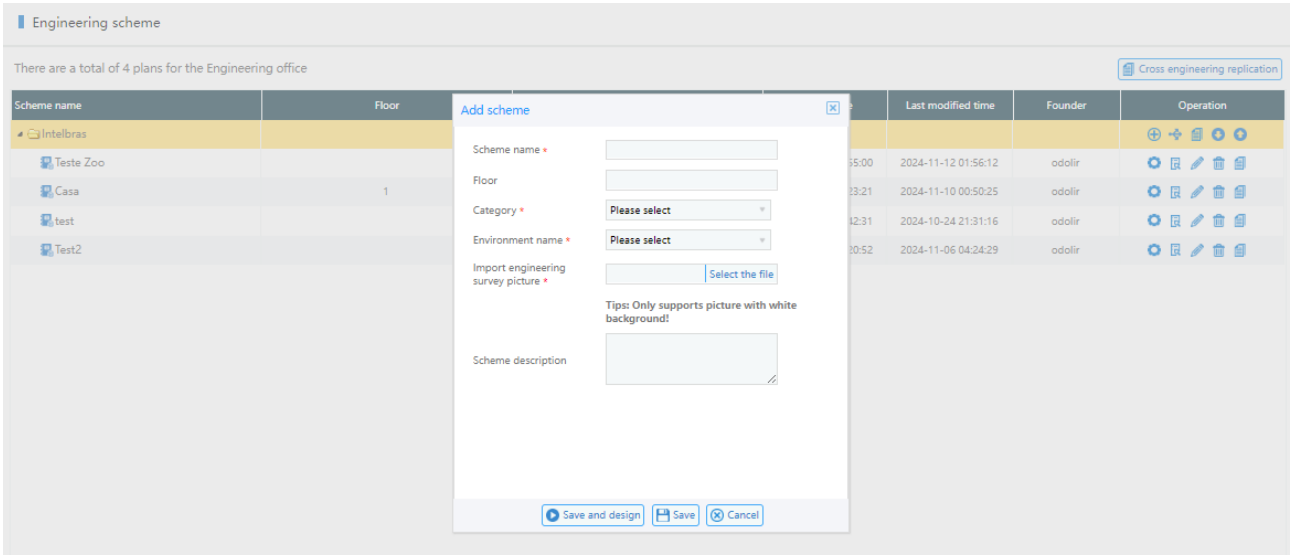
Figure 5-23 Adding group parameters



(4) Modify group: Click the modify icon in the group operation bar to pop up the group information window. You can modify the group name and group description.

(5) Adding a scheme: You can add a scheme directly under the engineering office, or you can create a new group first, then create a new scheme in that group.

Figure 5-24 Adding a scheme

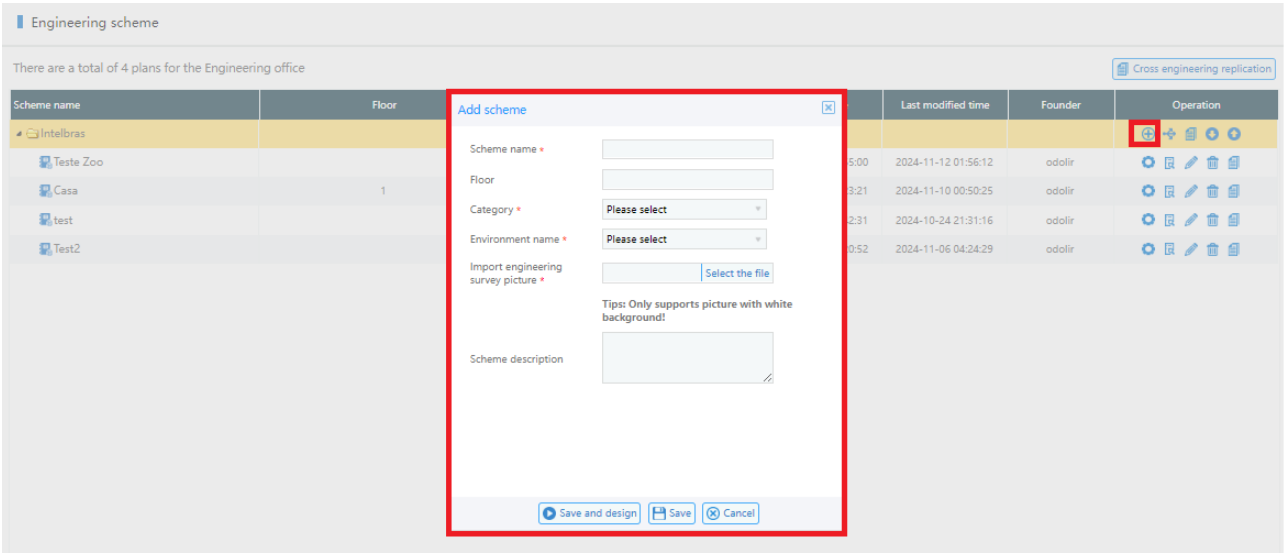


Explanation:

The number of schemes is limited, and the number of the same project scheme cannot exceed 30.

Step1 Tap the corresponding icon to open the solution adding panel.

Picture 5-1 Adding a Schema Panel



Step2 The input information includes the solution name and floor information.

Step3 Select industry category and environment name.

① Different environments correspond to different scheme designers of the overall default minimum field strength, the spot strength is less than the default value, indicating that the signal is not up to standard. The environment also specifies the overall attenuation coefficient, allowing users to customize the environment in the Basic data menu.

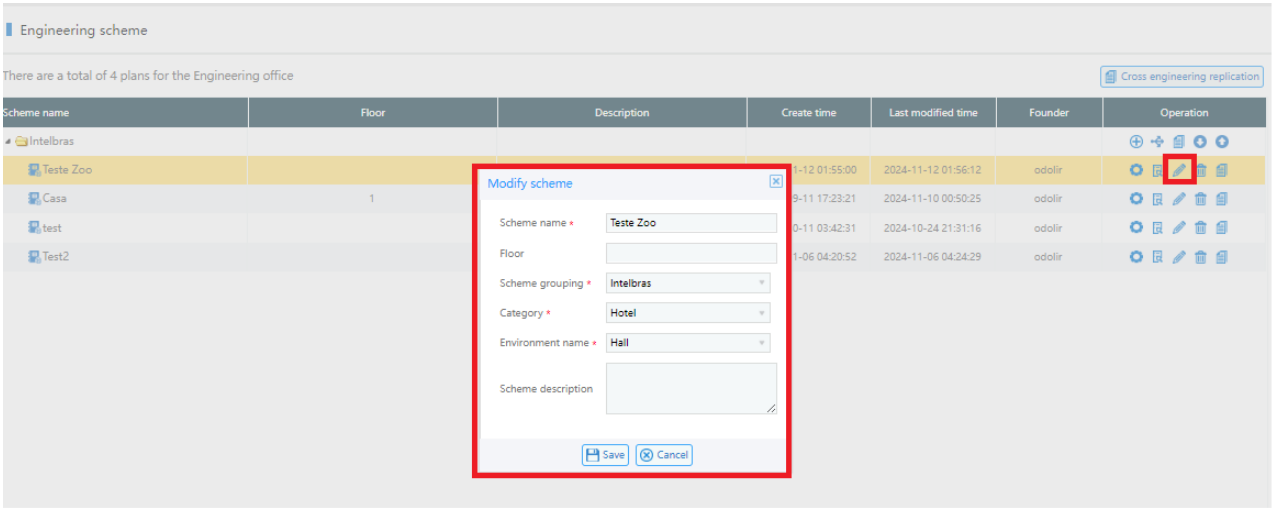
② Different industry categories correspond to the common environment name of the industry. At present, the system has 9 industry categories and 27 specific environments, and users can customize the environment.

Step4 Import the original site survey (jpg, bmp, png).

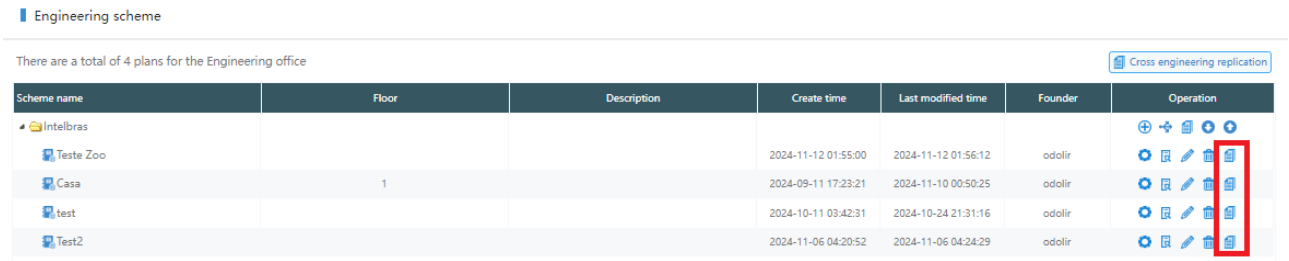
Step5 Click the < Save and Design > button to enter the Schema Designer interface directly. Click the Save button to directly save the current solution, without entering the designer page

(6) Modify the plan: Click the modify button in the action bar of the plan to pop up the modify plan window. You can modify the basic information of the plan, including the plan name, plan group, industry classification, environment name, and plan description. You can move the solution to the project root or any other group.

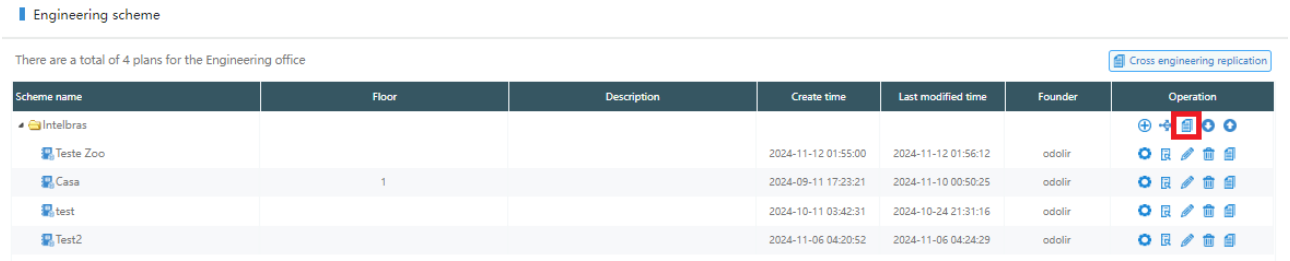
Figure 5-25 Modify plan



(7) Copy plan: Click the copy button in the plan operation bar to copy the current plan in the same group



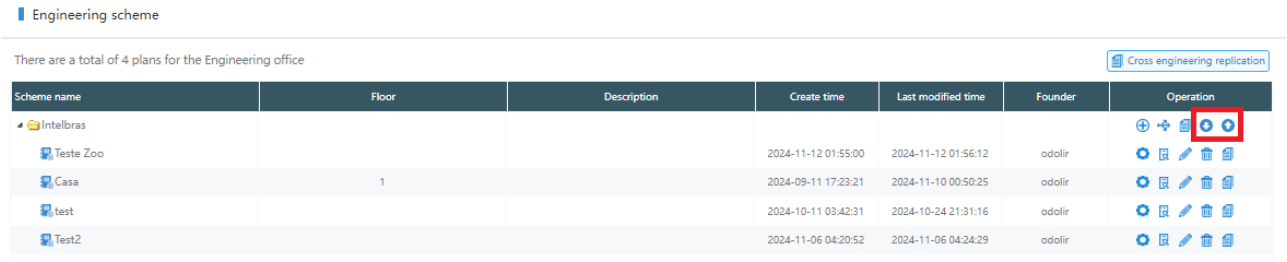
(8) Batch copy plan：Select multiple schemes that need to be copied, click the batch copy button, select the specified engineering site, batch copy the selected scheme, and the scheme name will increase the time suffix.



(9) Manual sorting of schemes in a group: users can manually drag and drop schemes in the same group to sort them manually. Click the save sorting button to save the sorting of the current scheme.

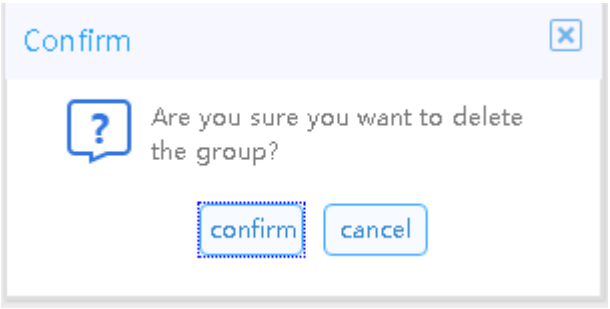
(10) Manual sorting of scheme groups: users can manually drag scheme groups to sort, and click Save sorting button to save the sorting of the current group.

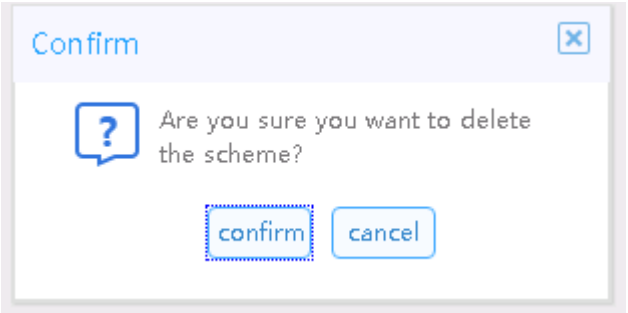
(11) Scheme sorting: Click the Scheme Ascending button and the Scheme Descending button to arrange the schemes belonging to the same group in ascending and descending order according to the scheme creation time.



(12) Delete: You can delete the scheme and group by clicking the icon in the corresponding operation column of the scheme and group. When there is a scheme under the group, you cannot directly delete the group.

Figure 5-26 Delete group and plan

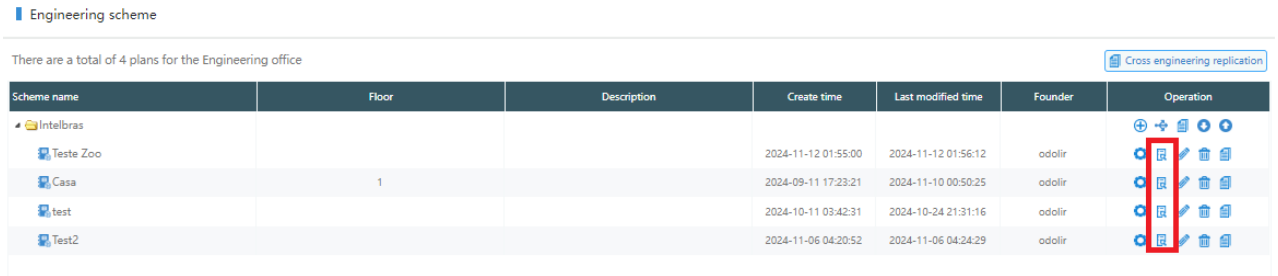




(13) Scheme design: Click the scheme design button under the scheme operation column, enter to the [scheme designer] page (in addition, when creating a scheme, you can also enter the designer page after saving and designing).

(14) Scheme result: Click the scheme result button under the scheme operation column to turn to the scheme result interface.

Figure 5-27 Scheme results



2.5.1 Solution Grouping

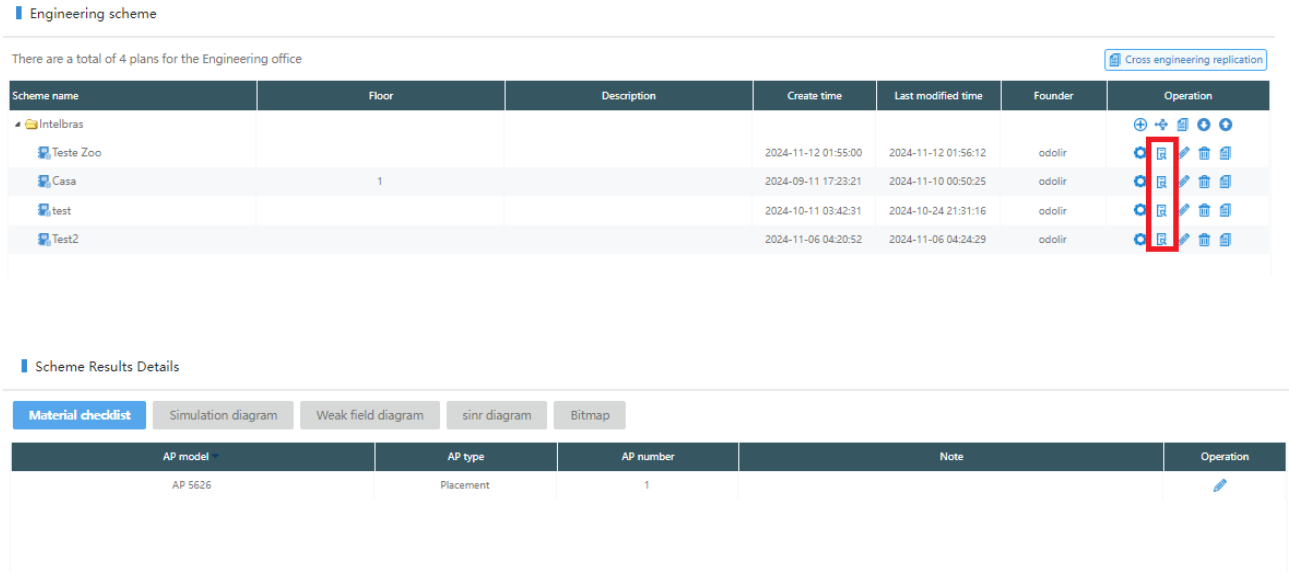
Scheme grouping tree: The project site, scheme grouping, and engineering scheme are displayed in a composite manner. The root node of the tree is the project site, and the branch is the scheme grouping, and the leaf node is the engineering scheme.

2.5.2 Solution Results

The result of the solution is a page that allows users to view the details of the solution quickly after the solution has been edited. It is divided into four parts by tabs: bill of materials, simulation diagram (to show signal strength), a weak field diagram (to show signal weak field), Bitmap (architectural plans and equipment placement points, not involving signal effect rendering).

(1) Click the scheme result button in the scheme operation bar to turn to the scheme result interface.

Figure 5-28 Enter the solution result page



(2) Bill of materials: Only the AP equipment list required for the current solution is displayed, and only remarks can be edited. The list includes: AP model, type, quantity, remarks, operation.

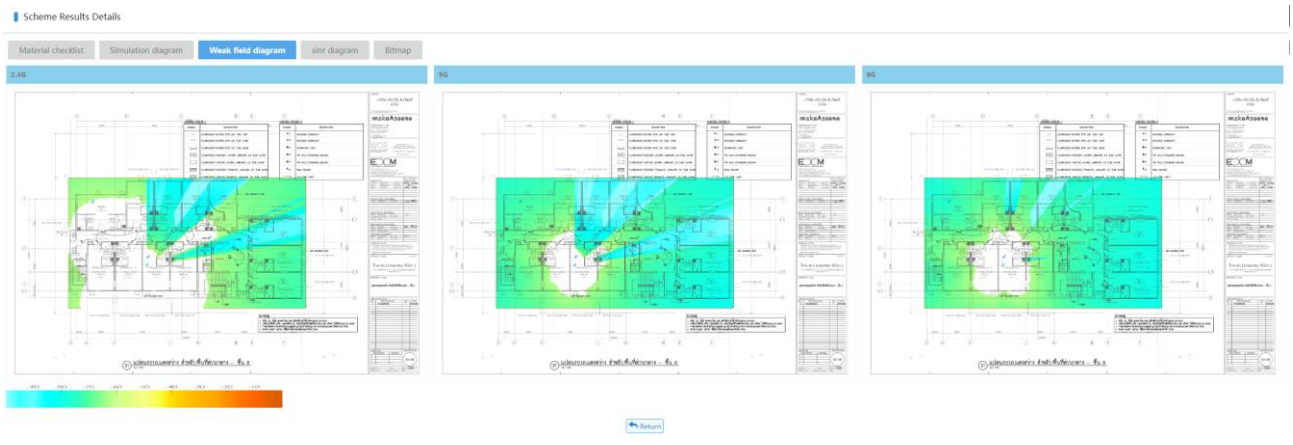
(3) Modify material: Only the remarks can be edited.

(4) Simulation diagram: The simulation picture is a picture formed by rendering the images of obstacles, AP equipment and field strength. According to the field strength, the simulation diagram will be displayed softly according to the gradient and the boundary, and both 2.4G and 5G should be displayed. According to the attenuation of different obstacles and the power of the AP device, the simulation diagram will change accordingly. If the AP supports 6G, the 6G simulation diagram should also be shown.

Figure 5-29 Simulation diagram

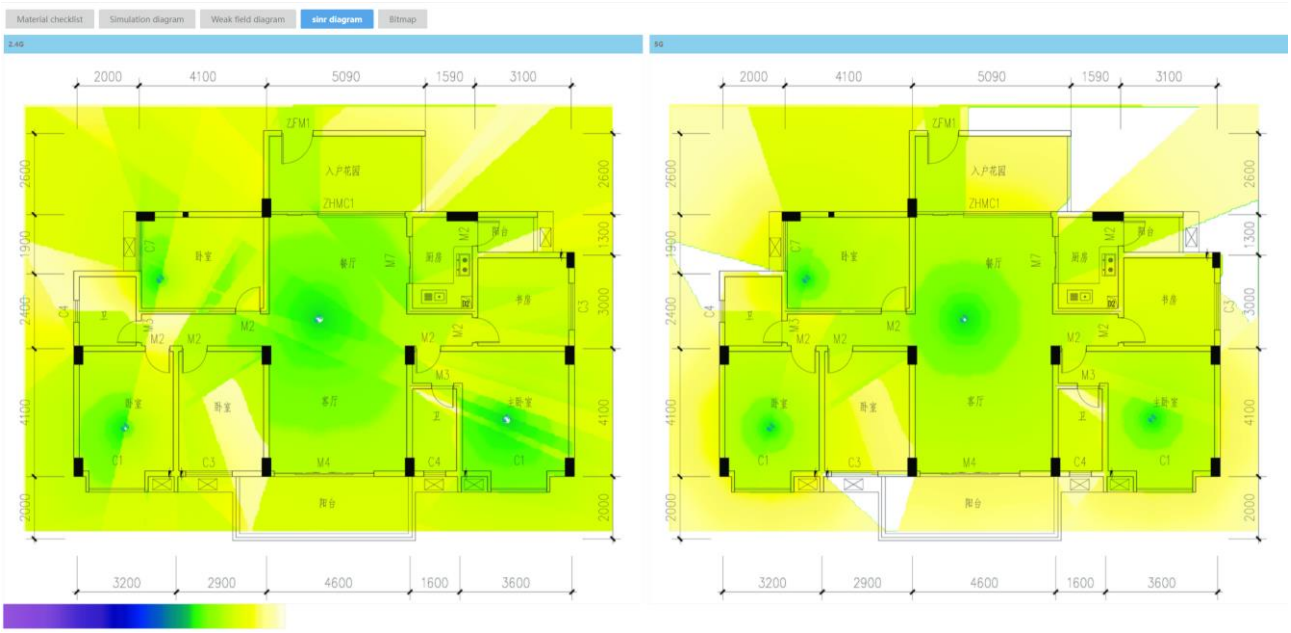
(5) Weak field image: The weak field image is a rendered image of AP equipment, and field strength. Unlike the simulation image, the weak field image focuses on signals that do not meet the requirements of the scene and the selected environment. The part that meets the conditions will not be rendered, and the part that not meets the conditions will be displayed in different colors according to the field strength gradient. Both 2.4G and 5G should be displayed. If the AP supports 6G, the 6G simulation diagram should also be shown.

Figure 5-30 Weak field diagram



(6) Field-strength interference map: The interference map is a map formed by rendering the images of AP equipment and signal-to-drying ratio. According to the intensity of the signal-to-drying ratio, there is a gradient and a soft boundary. According to the attenuation of

different obstacles and the power field of the AP device The strong interference map will change accordingly, and both 2.4G and 5G should be displayed.



(7) Bitmap: The bitmap contains ordinary bitmaps and acceptance bitmaps. Ordinary bitmaps are a combination of obstacles, AP equipment and engineering survey original drawings. The acceptance point map is based on the point map with the acceptance point, and it's purpose is to allow the site engineering survey and acceptance personnel to perform acceptance at a specific location.

Figure 5-31 Bitmap

Explanation:

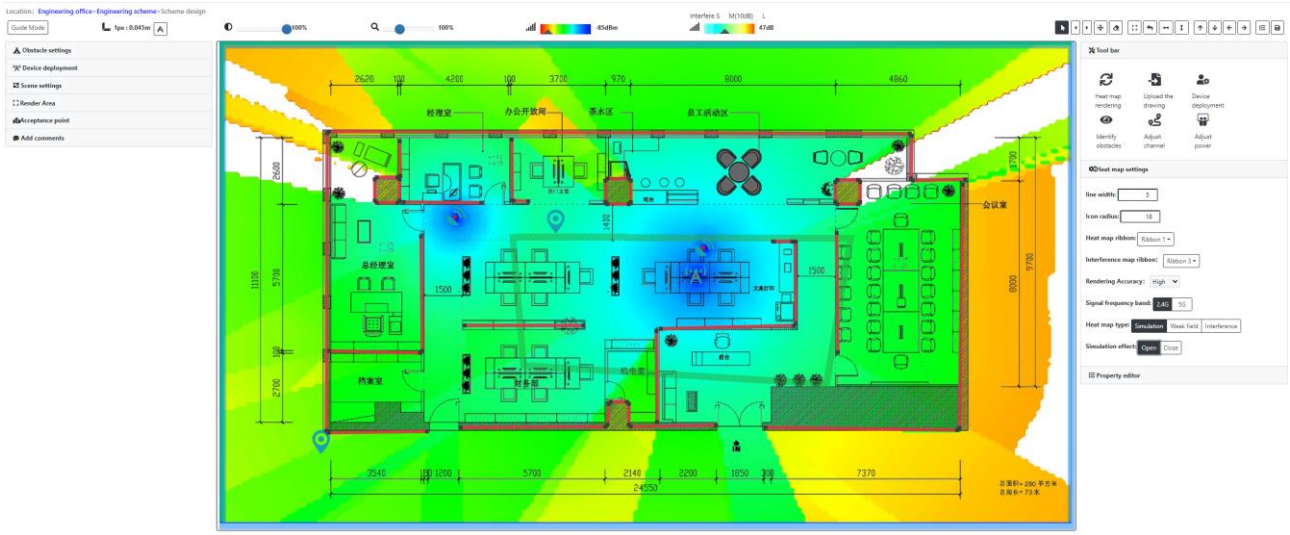
The acceptance point map is based on the map with the acceptance point, and it's purpose is to allow the site engineering survey and acceptance personnel to perform acceptance at a specific location.

2.5.3 Solution Designer

(1) Click the "Project Name" on the project site page or click the View Project Scheme button to turn to the project scheme page.

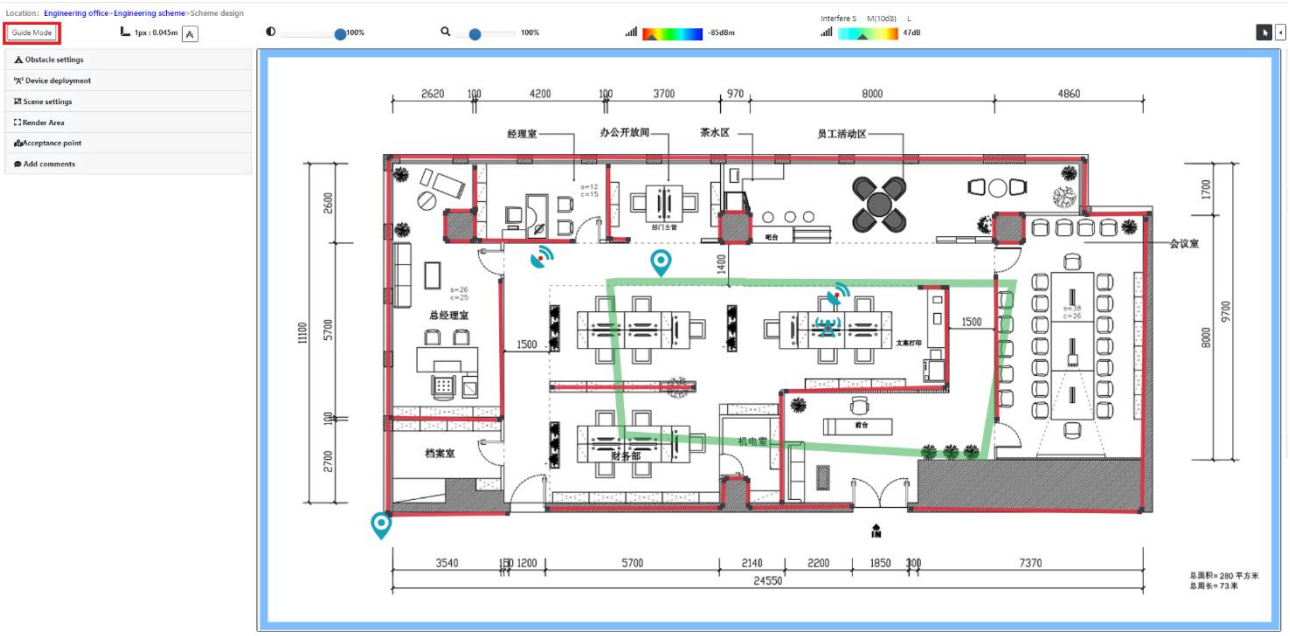
(2) Click the corresponding icon ⊕ to pop up the *Add Scheme* button. The input information requires the scheme name, industry classification, environment name, and scheme description. Click the <Save and Design> button to directly enter the [Solution Designer] interface. Or you can click the scheme design button in the existing scheme operation bar, and to open the [scheme designer] page.

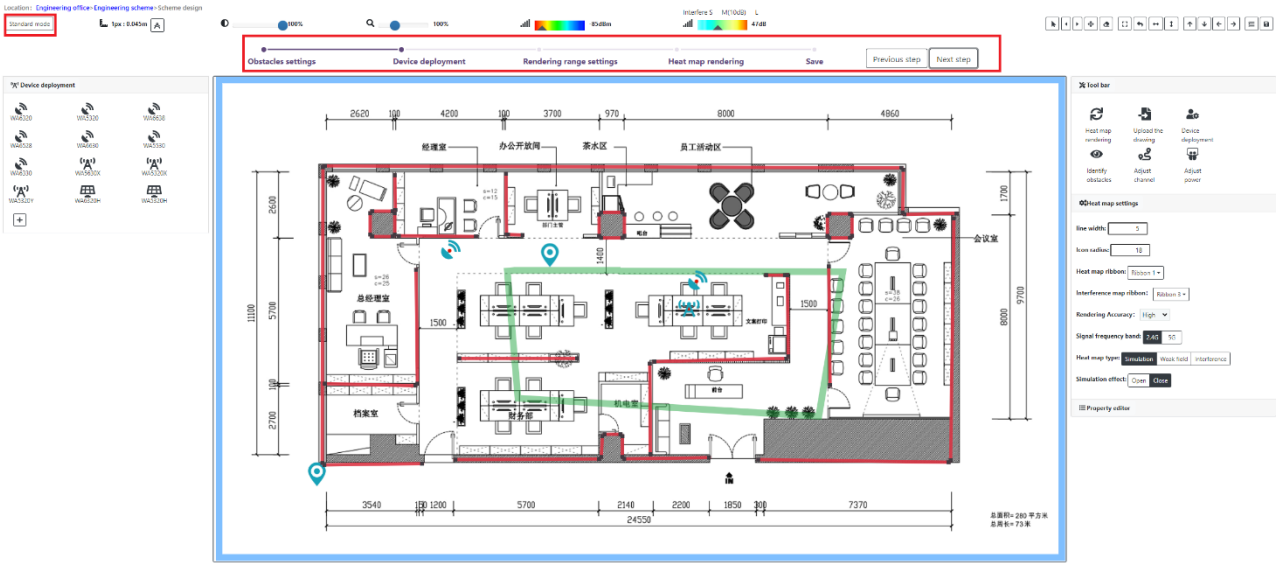
Figure 5-32 Solution Designer page



(3) Subdirectory: click the hyperlink to open the project list page or scheme list page

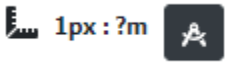
(4) Guide mode: Click the guide mode, the user can follow the prompts to design site survey maps and render heat maps.

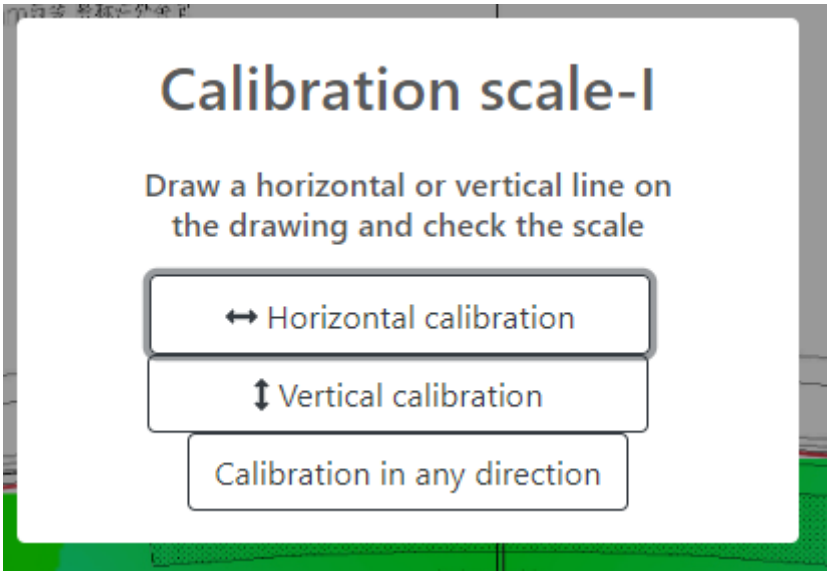


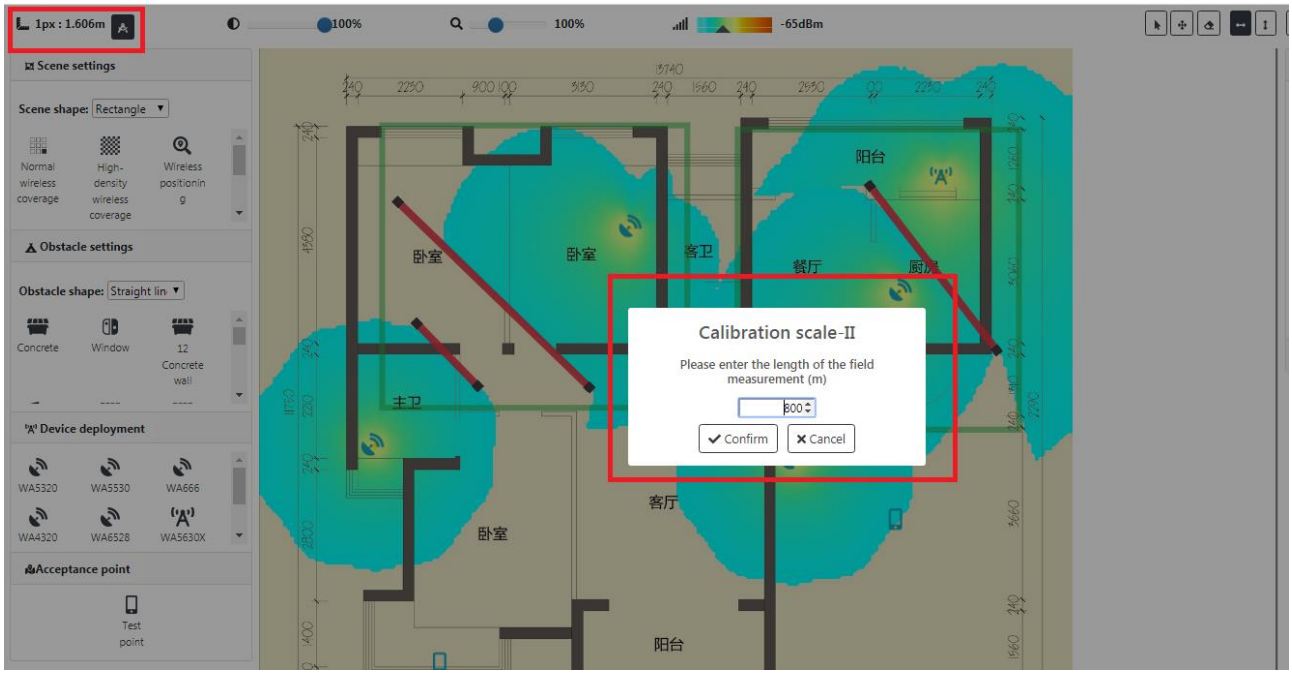


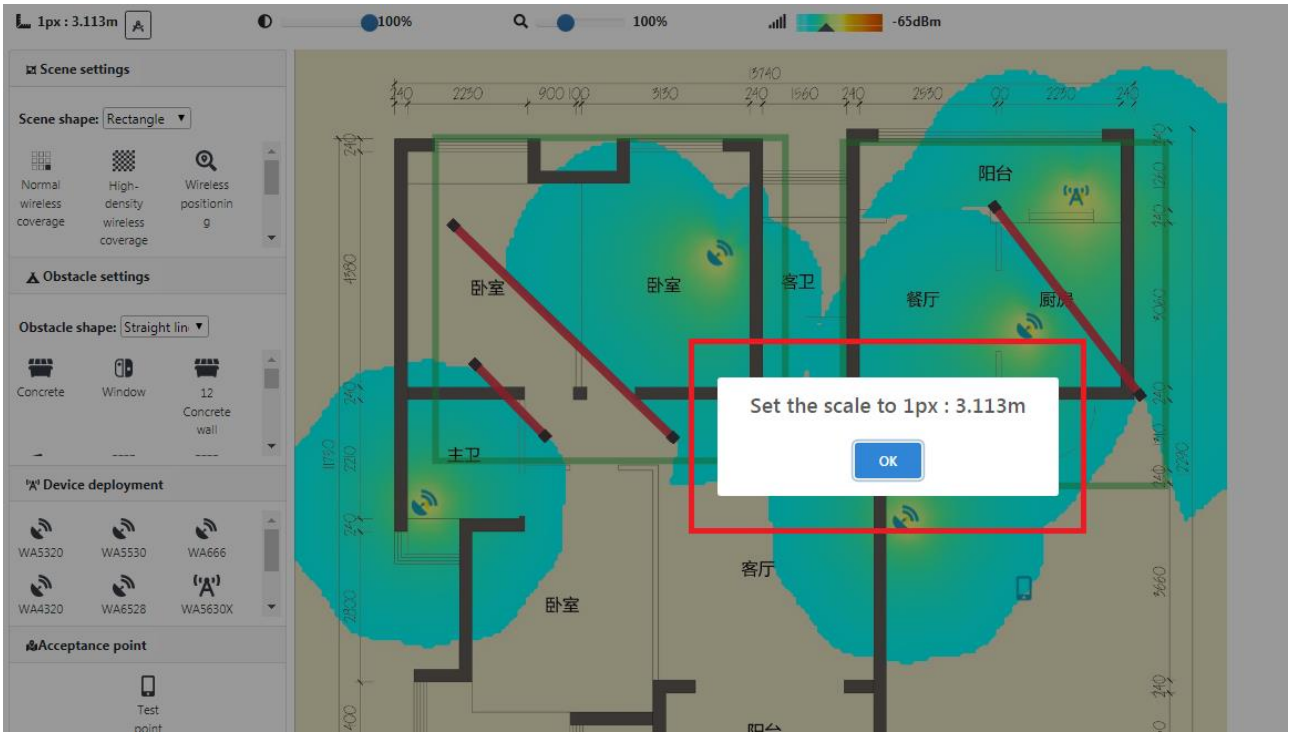
(5) Standard mode: After switching to the wizard mode, click on the upper left corner to enter the standard mode, switch to the standard mode, and design the site survey drawings.

(6) Set the scale: Click the button to draw a line in the drawing area, and the length of this line in the original engineering survey corresponds to the actual length. After drawing this line, a pop-up box appears to set the actual length of the drawn length. Enter the designer page and force the user to set the scale. No operation can be performed without setting.







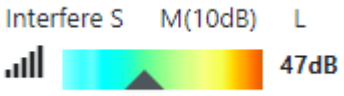


(7) Transparency: Select the transparency of 0-100 from the slider. When the transparency is 0, the original image is displayed. When the transparency is 100, the original image is invisible, but the transparency does not affect the simulation rendering.

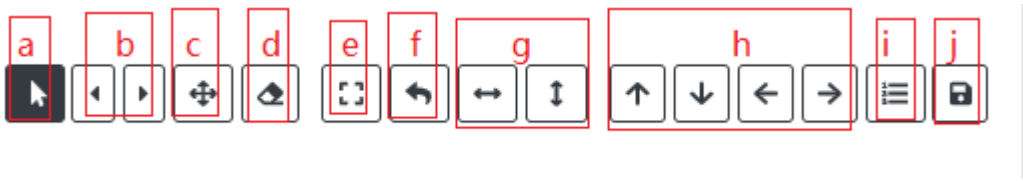
(8) Magnification: There are large or small imported engineering survey drawings. The slider can adjust the zoom size of the engineering survey drawings.

(9) Field strength threshold: manual adjustment of the default minimum field strength. Adjust the field strength threshold of the rendering effect, and you can choose a variety of colors for the color band of the simulation image. One of the rendering parameters of the rendering.

(10) Interference threshold: signal drying ratio threshold, default 20dB, adjust the drying ratio threshold of the rendering effect of the field intensity interference graph, and can select a variety of colors for the color band of the interference graph. One of the interference diagram rendering parameters.



(11) Top action bar: used to store the basic tools corresponding to the entire solution designer



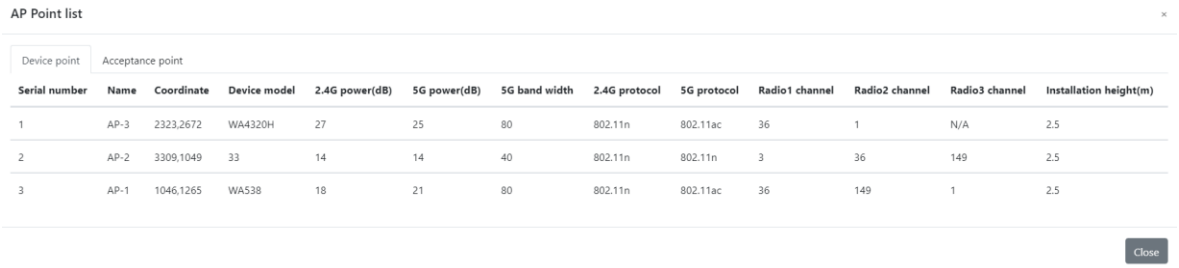
a. Select button: The default state is the selection state. When other settings (such as scene drawing, obstacle icon, AP device icon, etc.) are selected, the selection state becomes the corresponding state. When other settings are not selected, they are selected status.
b. Hide and display the left and right menu bars: Click to hide the left and right menu bars
c. Mobile drag and drop: used for mobile engineering survey drawings.
d. Erasing: Box selection erases user-drawn elements on designer pages
e. Box selection: box selection area, select the obstacles and equipment information in the area, and carry out the operation of multiple target objects, right-click operation and drag and move of multiple objects.
f. Revok: Click to return to the previous operation.

g. Horizontal line: When the horizontal line is selected, the horizontal line for drawing obstacles can only be parallel to the horizontal line. It does not affect the selection status and other setting status.

   Vertical line: When the vertical line is selected, the vertical line for drawing obstacles can only be perpendicular to the horizontal line. It does not affect the selection status and other setting status.

h. Move up, down, left and right: When obstacles, AP devices, test points, and scenes are selected, you can use the move buttons to move up, down, left, and right. When it is not selected, the engineering survey is moved by default.

i. Statistics column: The statistics column is located above the entire designer, including AP point list and test point list.


AP Point list

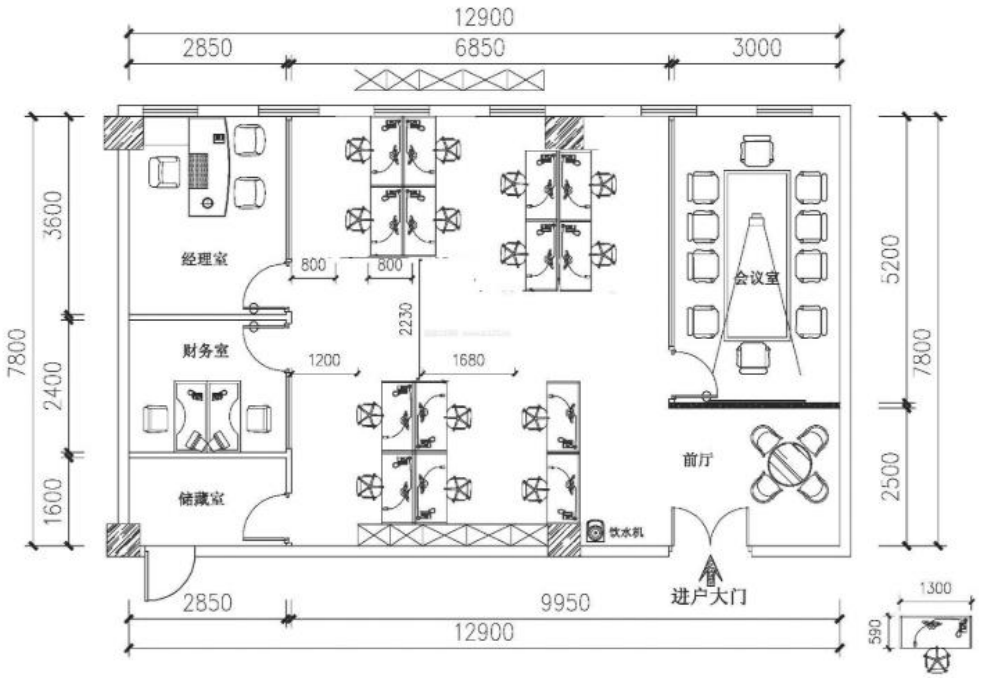
Device point | Acceptance point

Serial number	Name	Coordinate	Device model	2.4G power(dB)	5G power(dB)	5G band width	2.4G protocol	5G protocol	Radio1 channel	Radio2 channel	Radio3 channel	Installation height(m)
1	AP-3	2323,2672	WA4320H	27	25	80	802.11n	802.11ac	36	1	N/A	2.5
2	AP-2	3309,1049	33	14	14	40	802.11n	802.11n	3	36	149	2.5
3	AP-1	1046,1265	WA538	18	21	80	802.11n	802.11ac	36	149	1	2.5

Close

j. Save: It is used to save the scheme. It will automatically save the most recent operation by default in 30s.

(12) Drawing area: The drawing area is the representation area of the scheme designer ,which Contains the original engineering survey map, AP equipment, obstacles, scene division, and test points.



parameter:：

· Scale bar, format is 1px : ? mm. Click the calibration button, draw a line on the drawing, and check the scale. It effects rendering parameters.

· Transparency, adjust the transparency of the background image. It effects rendering parameters.

· Magnification, adjust the zoom ratio of the effect picture.

· Field strength, adjust the field strength threshold of the rendering effect. It effects rendering parameters.

· Draw lines horizontally, lines can only extend horizontally.

· Draw lines vertically. Lines can only extend vertically.

· Pan up, Y-coordinate of graphic element composition point -1.

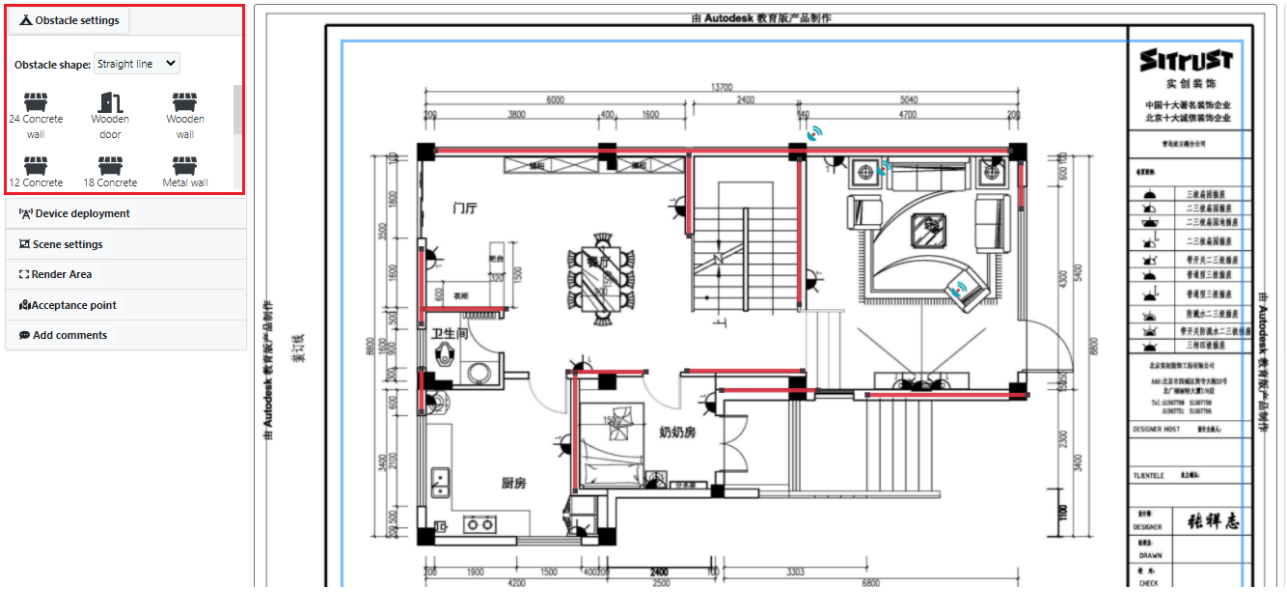
· Pan down, Y-coordinate of graphic element composition point +1.

· Pan left, X-coordinate of graphic element composition point -1.

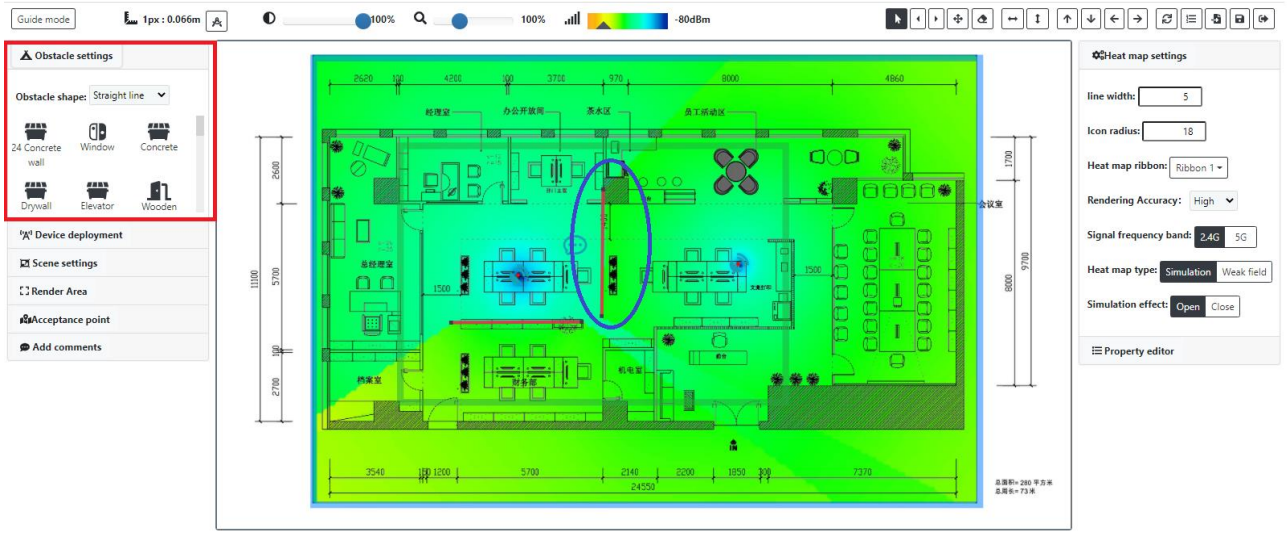
· Pan right, X-coordinate of graphic element composition point +1.

(13) Obstacle settings: Draw obstacles and click on the corresponding obstacle icon to continue drawing. When selecting a straight line drawing, left click to draw the starting point of the obstacle and right click to draw the ending point of the obstacle. According to the frequency of use, the four most used are listed first.

- Shape: straight line, polyline, rectangle;
- Obstacle icon: After selecting, it will always be in the state of drawing obstacles. Click again to cancel the state of drawing obstacles.



- Drag and drop obstacles: switch the top toolbar to the mouse function, select obstacles and drag them to the specified area.



(14) Device deployment: Device deployment is used to deploy and select AP devices. This type of device is selected and can be continuously deployed in the drawing area. Device types include placement type 

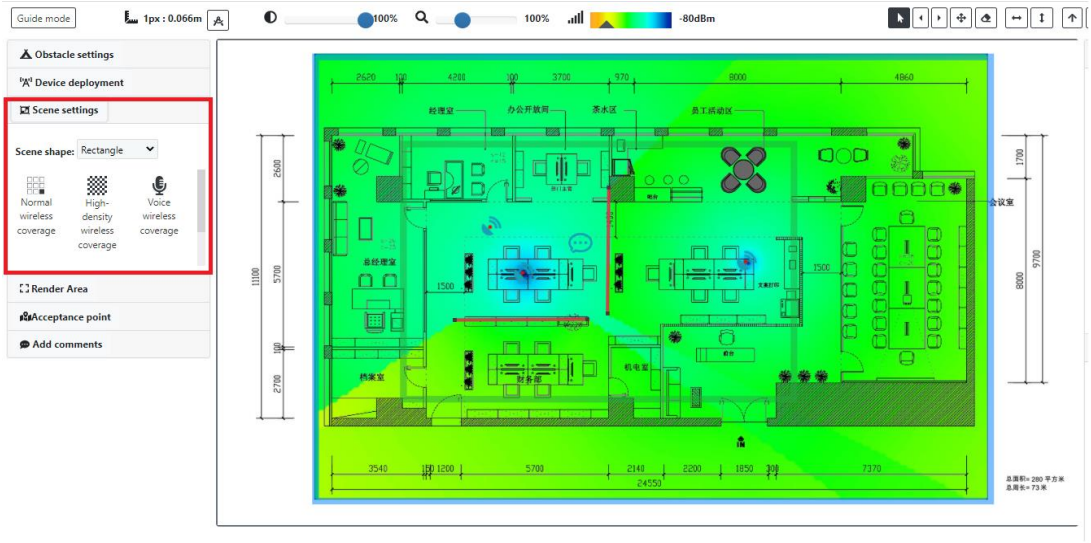
, outdoor type 

, X-Share, panel type 
, and engineer-defined type.

- Device icon: According to the frequency of use, the most frequently used AP devices are listed in front.
- Device move operation: switch to the select button on the top toolbar, select the device and drag it to the specified area.

(15) Scene setting: It is used to divide the use scene of a certain part of the engineering survey map. Each scene has a minimum field strength intensity. Below this value, it will be displayed in the weak field diagram. The signal strength that meets this value will not be displayed, and multiple scenes can be set.

- Scene list: scene name + minimum field strength, displayed in the drop-down box;
- Shape: Support rectangle and polygon.

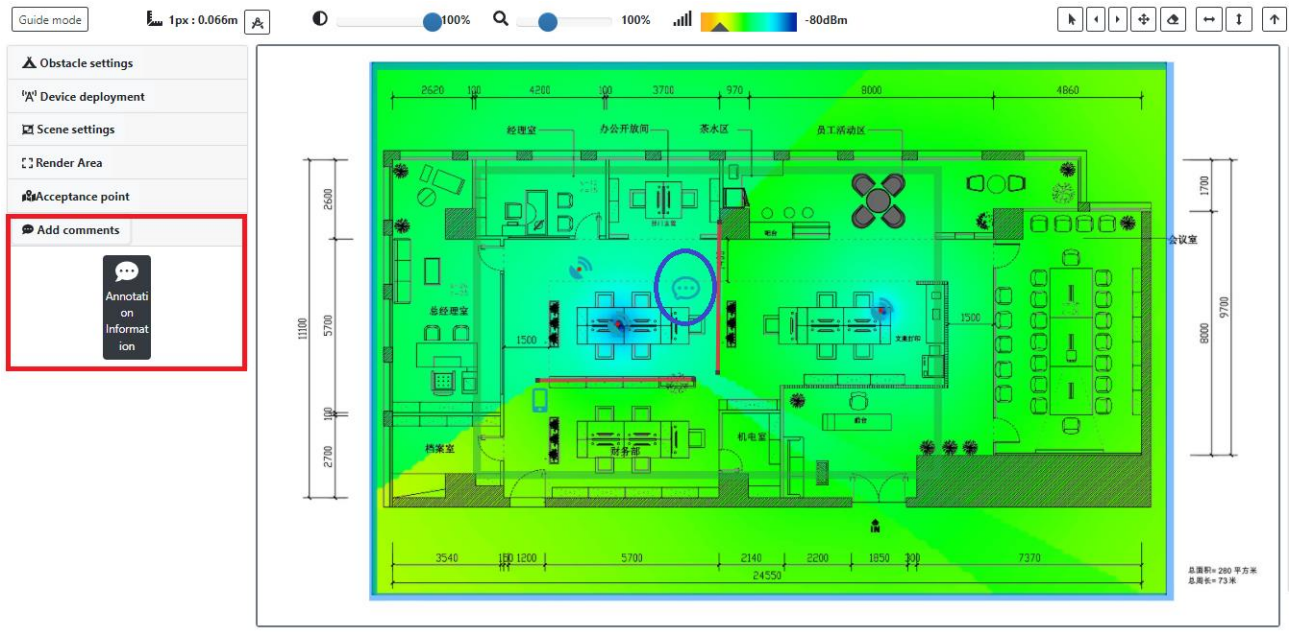


(16) Rendering area: the rendering area of the site survey drawing. Site map rendering only renders the part within the effective area. The excess part is not rendered.

(17) Acceptance point deployment: The test point is a recommended test point drawn by the engineering survey designer for on-site engineering survey acceptance. The point map and test point location are transmitted to the non-dimensional APP in the background and delete.

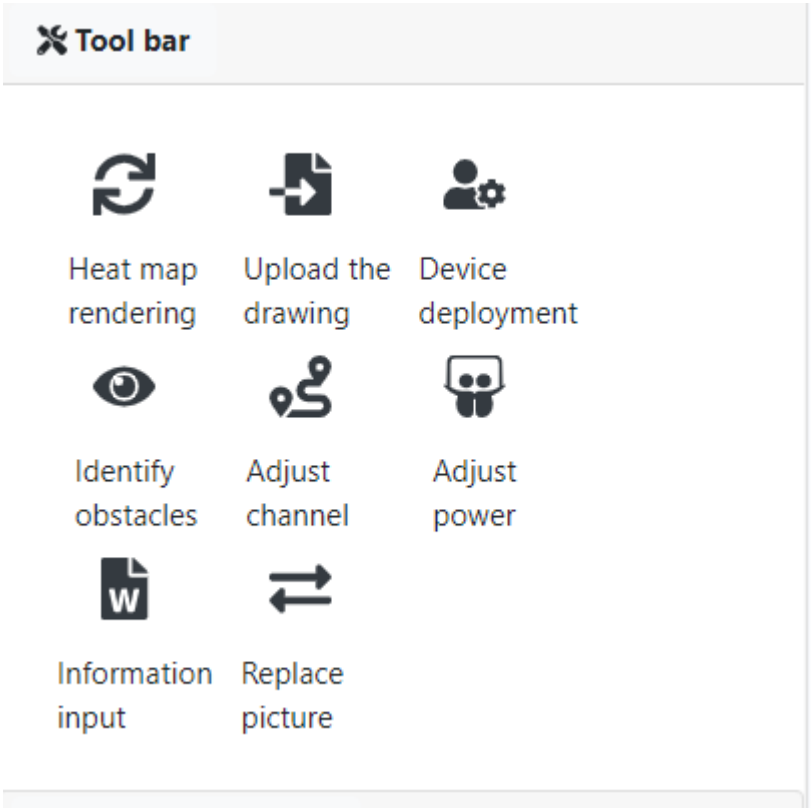
- Acceptance point icon: Click the icon of test point to be in the state of drawing test point, set the height of acceptance point and terminal type, and then draw.
- Acceptance point movement operation: switch to the selection button on the top toolbar, select the acceptance point icon and drag it to the designated area.

(18) Annotation information: annotation information is the remark information added by engineering exploration and design personnel in the process of drawing, which is convenient for later viewing.



- Move the comment icon: switch to the selection button on the top toolbar, select the comment icon and drag it to the designated area.

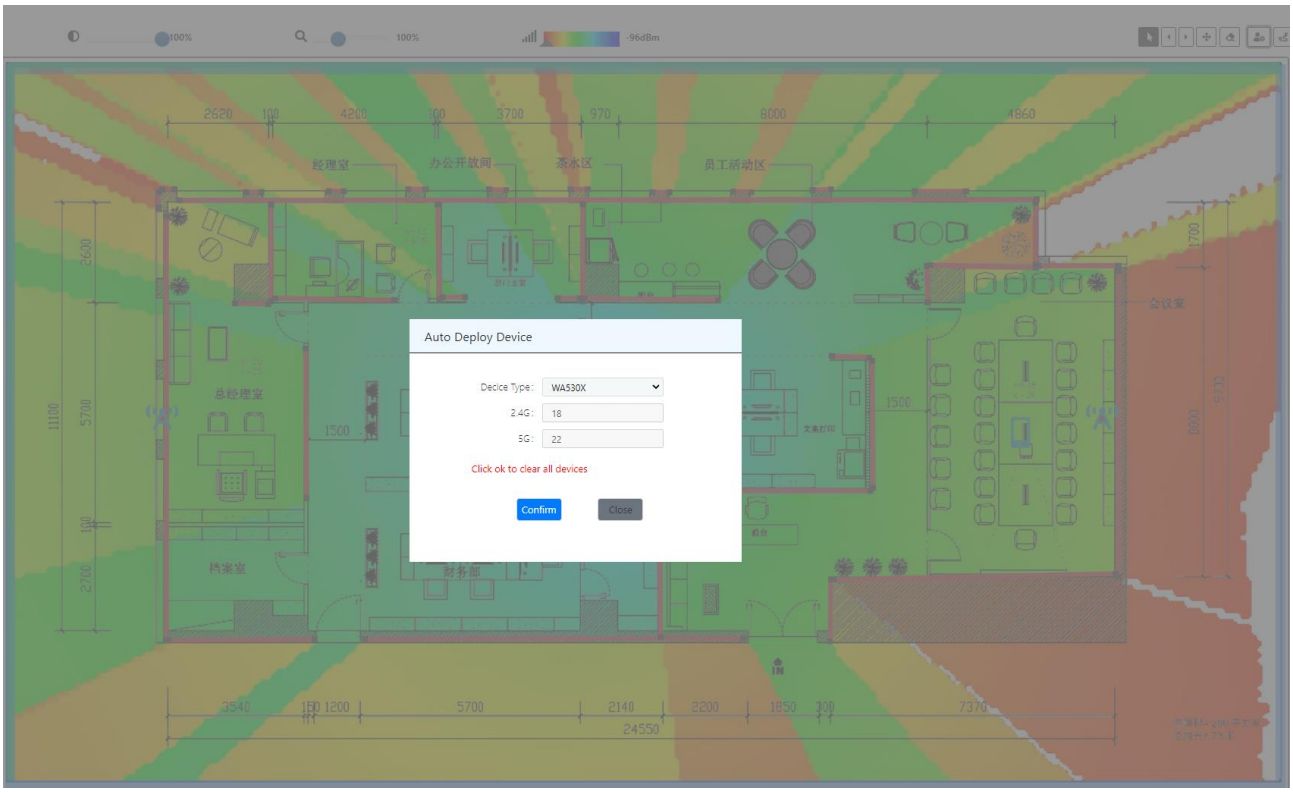
(19) Toolbar: main functional area of designer page.



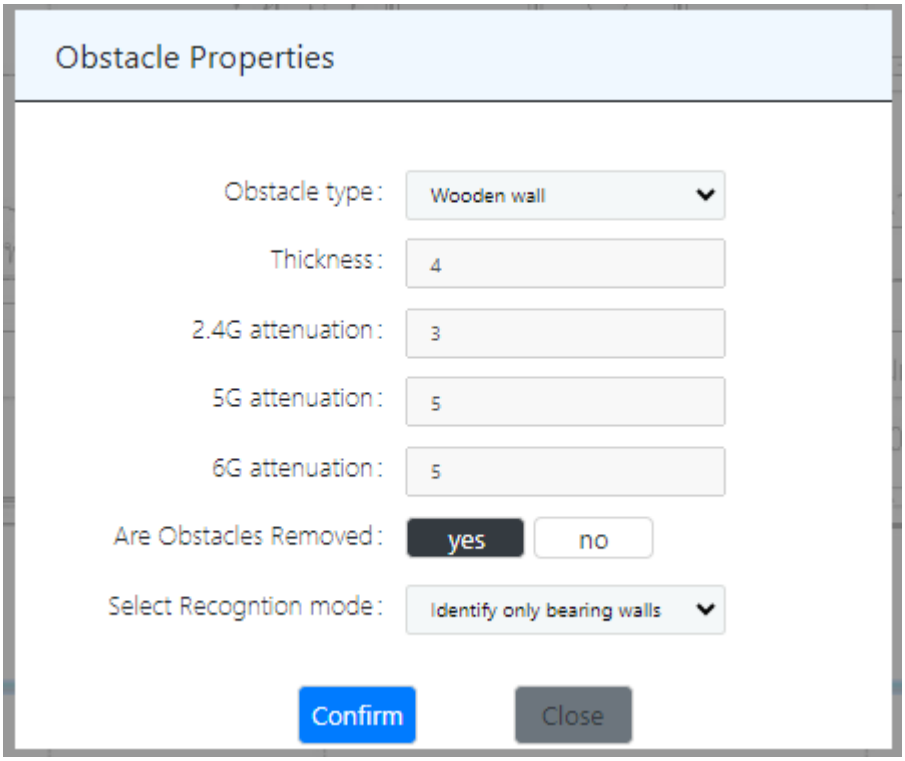
a. Heat map rendering: Click the refresh icon at the top right of the page to refresh the rendering.

b. Upload the drawing: Re-importing the original engineering survey plan will overwrite the original engineering survey plan and simulation results. On the Project Designer page, click the Import Engineering Survey Icon and select a local image file. Imported original engineering survey plans, which supports zoom in and out, adjust transparency. In addition, the imported engineering survey plan will also be selected when creating a new scheme.

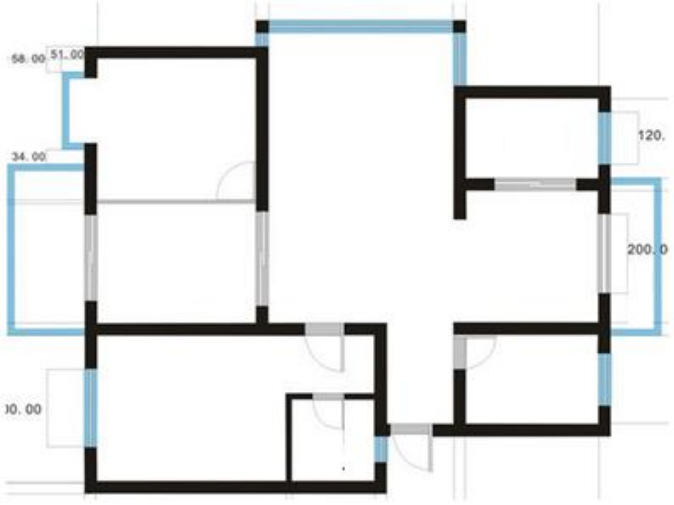
c. Device deployment: Click the automatic deployment button, according to the device selected by the user, using the coordinates of the center point of the rendering range as the starting point, the cellular type deploys the devices in sequence, and automatically adjusts the device channels to prevent signal interference between adjacent devices .



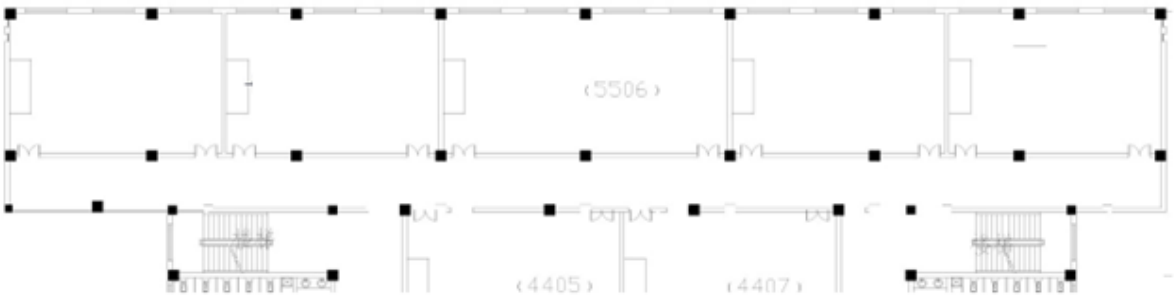
d. Identify obstacles: click the automatic obstacle recognition button, and the equipment obstacle recognition attribute will recognize the black cylindrical obstacles in the original industrial survey drawing and set them as the specified obstacles.



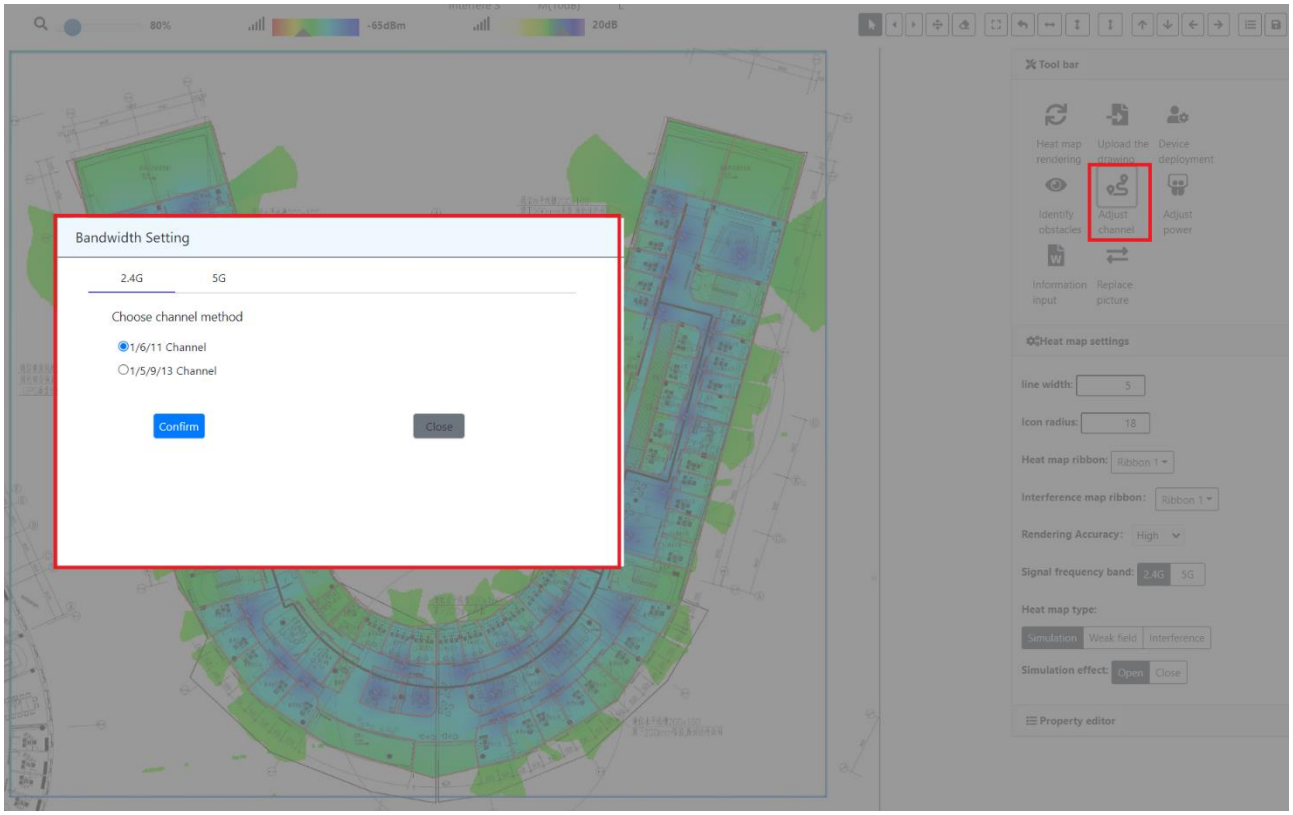
① Only the bearing walls are identified, the sample drawings are as follows：

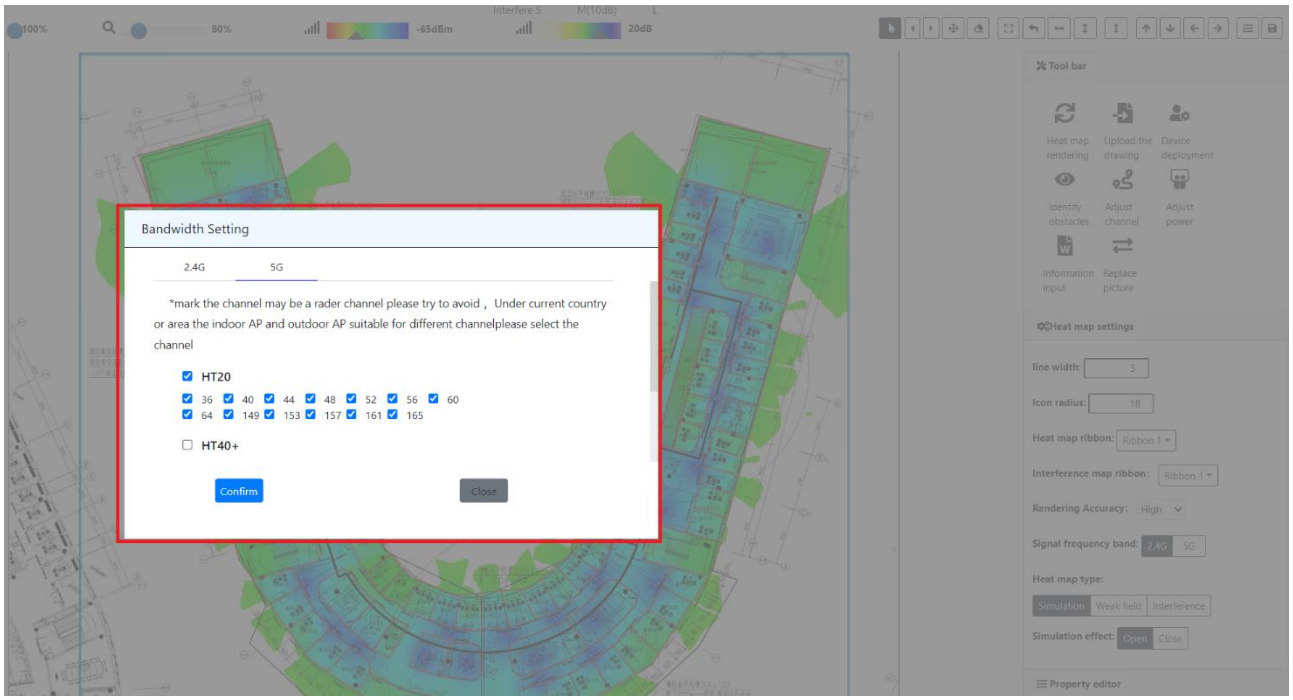


② Identify load-bearing walls and connecting walls, sample drawings are as follows



e. adjust channel: Click the channel adjustment button, the user selects the channel calculation method corresponding to 2.4G/5G, and adjusts the channel for the devices manually deployed by the user to prevent signal interference between adjacent devices.

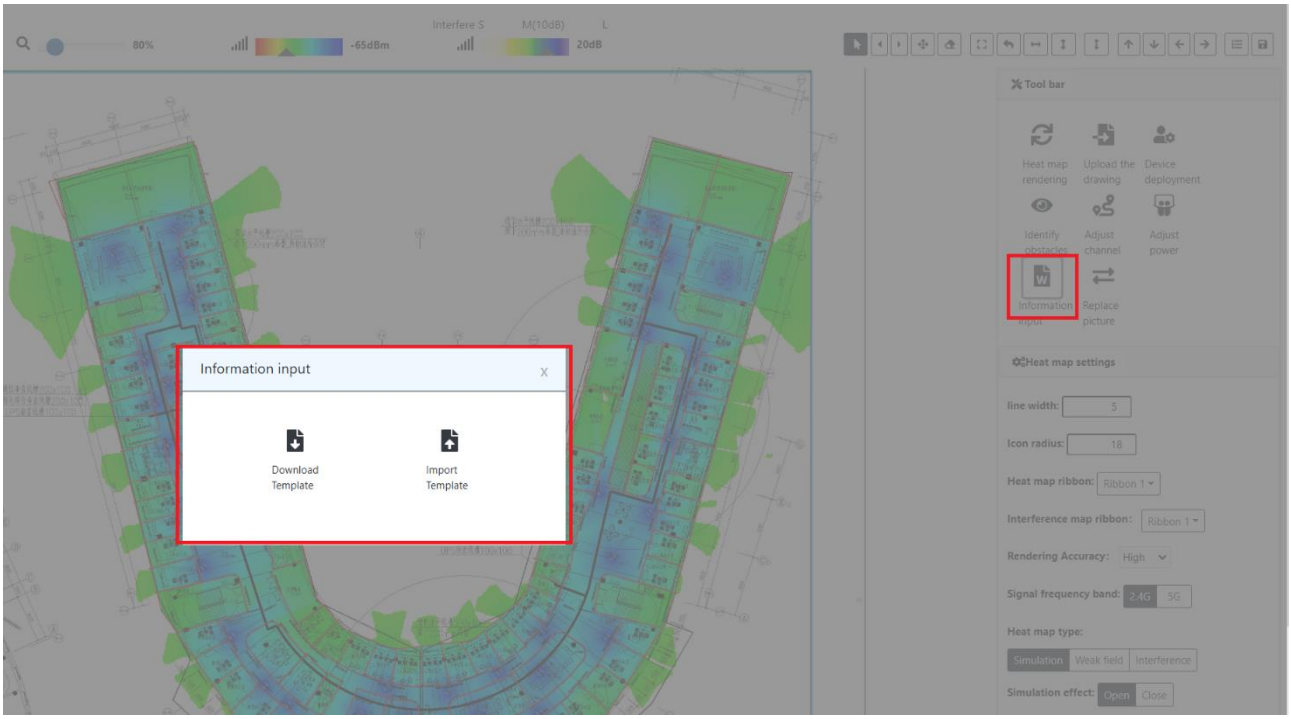




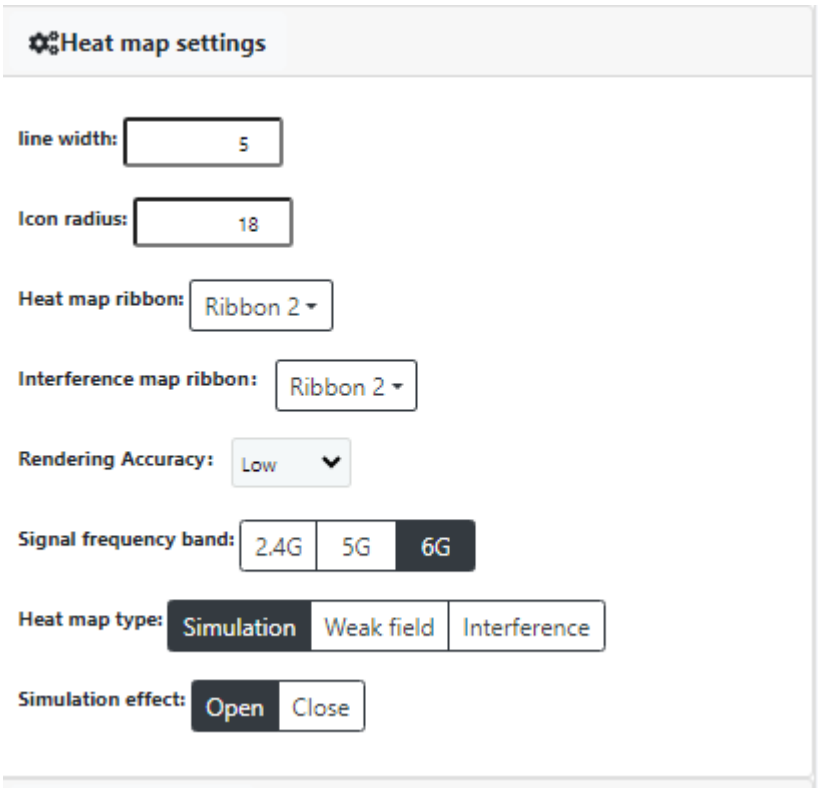
f. adjust power: After setting the scale and rendering range, click the power adjustment button to adjust the transmitting power of the deployed equipment so that the radiation signal intensity of the adjacent equipment is -65dbm.

g. Information input: It supports exporting the AP device list of the current scheme. After the user has completed the modification, the AP device information of the current

scheme can be modified in batches through the import function, Include ap name, installation height, 2.4G power, 5G power, 6G power, whether 6G is supported, Radio 1, Radio 2, and Radio 3 information.



(20) Simulation diagram configuration: The simulation diagram configuration can show different simulation diagrams for different parameter configurations.



- Line width: Draw the line width of obstacles etc. in the picture.
- Icon radius: the picture radius of the device and test point.
- Heat map ribbon: Multiple color series can be selected for the ribbon of the simulation map
- Interference ribbon: Multiple color series can be selected for the ribbon of the interference map
- Rendering accuracy: divided into three levels: high, middle and low. Corresponds to the jagged fineness of the actual rendering drawing.
- Signal frequency band: one of the parameters for switching between page rendering effects.
- Heat map type: Currently, field strength map and weak field map are supported. The field strength map is a conventional simulation map, and the weak field map is a reversed field strength map. If no scene is set, the default field strength of the selected environment shall prevail. When the field strength is lower than the default value, the weak field map will be color-coded, while the part meeting the field strength is not be rendered. The parts that do not meet the conditions will be represented by the difference in color depth. Through the weak field diagram, you can quickly find out which parts of the diagram do not meet the specified field strength signal. If a scene is set, when a weak field map is selected, the part of the scene that is delineated will be rendered according to the default minimum field strength of the corresponding scene, and the part of the undefined scene will be rendered according to the minimum field strength of the environment. When the scene is set, in the weak field graph, there will be a prompt when the signal is not up to the standard.
- Enable simulation button: display simulation map when turned on, and display unrendered bitmap when turned off.

2.6 Basic data

The basic data is the various influencing factors in order to facilitate the custom scheme designer, users can add, modify and delete various parameters defined by themselves.

2.6.1 AP device management

AP device management mainly includes the functions of adding, deleting, modifying, and restoring (system default devices) AP device related information. It supports users to customize and add required devices, which makes AP device deployment and BOM editing more flexible.

Explanation:

Query by page. By default, the AP devices are sorted in ascending order. Only the preset AP device data and data created by the currently logged in user are visible.

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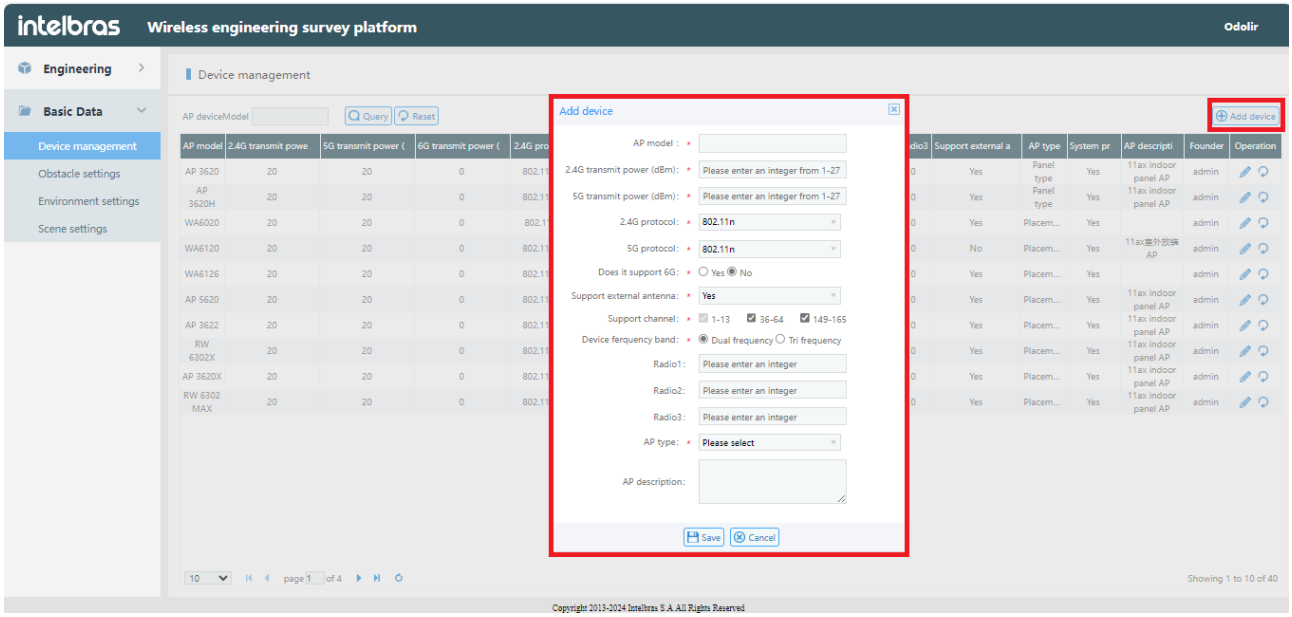
(1) Log in to the INTELBRAS WSS cloud engineering survey and select the [Basic Data / AP Device Management] menu item in the left navigation to enter the AP device management page.

(2) List display: AP model, 2.4G transmit power, 5G transmit power, 6G transmit power (dBm), whether 6G is supported, 2.4G protocol,5G protocol, Radio1 channel, Radio2 channel, Radio3 channel, supportting channel, AP type, support external antenna, system preset (yes, no), AP description, operation bar (modify , delete , restore default)The system default AP device attributes support restoring default values, but do not support deletion.

(3) Add device: Click the <Add Device> button to pop up the Add Device window. The input information includes the AP model, 2.4G transmit power (dBm), 5G transmit power (dBm), 6G transmit power (dBm), whether 6G is supported,2.4G protocol, 5G protocol, support external antenna, Radio1 channel, Radio2 channel, Radio3 channel, and AP description. Select the supported channel (1- 13, 36-64, 149-165), AP type.

Figure 5-33 Add AP device



(4) Modify device: Click the icon of the corresponding operation column of the device to pop up the modify device window. The modified attributes include AP model, 2.4G transmit power (dBm), 5G transmit power (dBm), 6G transmit power (dBm), whether 6G is supported, 2.4G protocol,5G protocol, support external antenna, Radio1 channel, Radio2 channel, Radio3 channel and support channel (1-13, 36- 64, 149-165),Radio channels, AP description. The system's default APs do not support modification types. Custom APs can modify AP types.

(5) Delete device: Click the icon in the corresponding operation column of the device to delete the device.

Explanation:

The system default device does not support deletion.

(6) Restore default device: In the device list whose status is the system default, there is a function to restore the default in the operation bar.

parameter:

- AP model: Model of wireless network access device.
- 2.4G transmit power (dBm): Radio frequency (Radio Frequency) means the electromagnetic frequency with long-distance transmission capability that can radiate into space. 802.11b / g in the IEEE 802.11 wireless local area network protocol works in the 2.4GHz radio frequency band.
- 5G transmit power (dBm): Radio frequency (Radio Frequency) refers to electromagnetic frequencies that have long-distance transmission capabilities and can radiate into space. 802.11a in the IEEE 802.11 wireless local area network protocol works in the 5GHz radio frequency band.
- Support channels: According to different working frequencies, radio frequency can be divided into channels (representing the transmission channel using wireless signals as transmission media), and each channel corresponds to a frequency range.
- Channel value configuration needs to be configured according to different regions and devices.

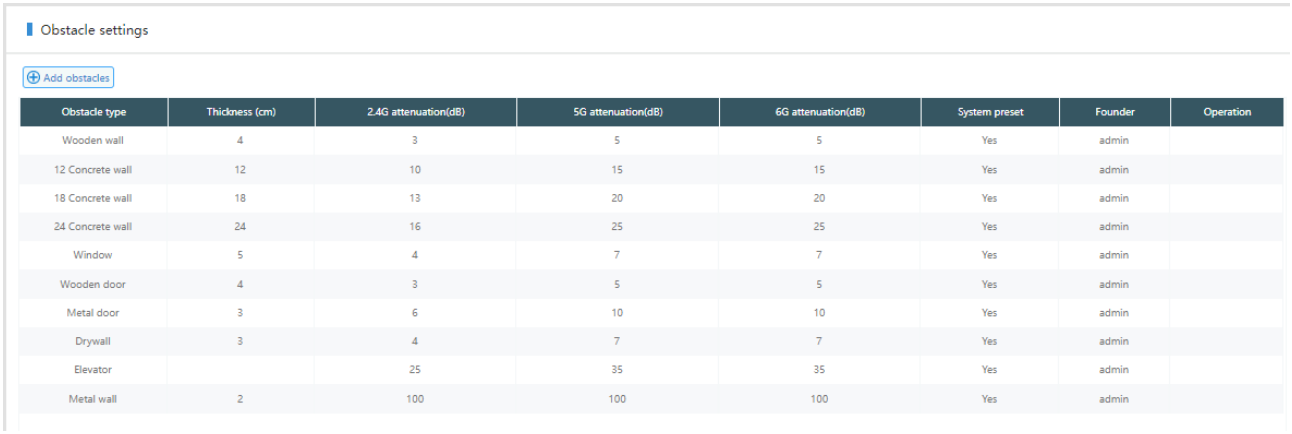
  AP device channel value setting: for example, domestic wireless device WA5320 is dual-frequency AP, WA6630 is triple-frequency AP (WA5340 is a 4-frequency AP, which is seldom used at present). For dual-band APS, Radio 1 is 5G radio and supports channels 36-64 and 149-165, with a channel value every 4. Radio 2 is 2.4g and supports channel 1-13 (optional). For tri-band AP, Radio 1 is 5G RADIO and supports channel 36-64, Radio 2 is 5G radio and supports channel 149-164, and Radio 3 is 2.4g and supports channel 1-13 (optional).

- 2.4G protocol: value range (802.11n, 802.11AC, 802.11ax). For example, the domestic wireless device WA5320 WA4320, the device model starts with 4 and 5, 2.4G supports the highest protocol 802.11n; For example, WA6630, the device model starts with 6, and 2.4g supports the highest protocol 802.11ax
- 5G protocol: value range (802.11n, 802.11AC, 802.11ax). For example, domestic wireless device WA5320 WA4320, the device model starts with 4 and 5, 5G supports the highest protocol 802.11AC; For example, WA6630, the device model starts with 6, and 5G supports the highest protocol 802.11ax.
- Support external antenna: All devices support the use of external antennas, if supported, you can choose a specified external antenna.

2.6.2 Obstacle settings

Obstacle settings support user-defined addition, deletion, and modification of obstacle attributes (the default type of the system cannot be modified and deleted).

Figure 5-34 Obstacle settings

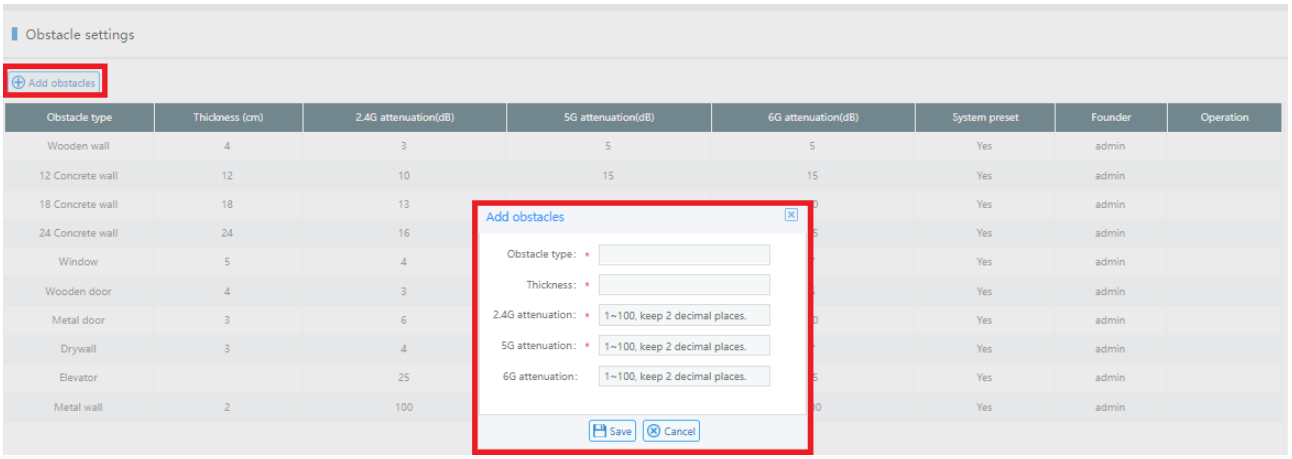


Obstacle type	Thickness (cm)	2.4G attenuation(dB)	5G attenuation(dB)	6G attenuation(dB)	System preset	Founder	Operation
Wooden wall	4	3	5	5	Yes	admin	
12 Concrete wall	12	10	15	15	Yes	admin	
18 Concrete wall	18	13	20	20	Yes	admin	
24 Concrete wall	24	16	25	25	Yes	admin	
Window	5	4	7	7	Yes	admin	
Wooden door	4	3	5	5	Yes	admin	
Metal door	3	6	10	10	Yes	admin	
Drywall	3	4	7	7	Yes	admin	
Elevator		25	35	35	Yes	admin	
Metal wall	2	100	100	100	Yes	admin	

(1) List display: including obstacle type, thickness, 2.4G attenuation, 5G attenuation, 6G attenuation, system preset (Yes, No), operation bar (Modify, Delete), as shown in the figure below.

(2) Add obstacles: including obstacle type, thickness, 2.4G attenuation, 5G attenuation, 6G attenuation.

Figure 5-35 Adding obstacles



(3) Modify obstacles: include obstacle type, thickness, 2.4G attenuation, 5G attenuation, 6G attenuation. The default obstacles cannot be modified.

(4) Deleting obstacles: The default obstacles in the system cannot be deleted.

parameter:

- Obstacle type: It prevents analog mesons that hinder wireless signal transmission, and is used to better simulate the real scene environment.
- Thickness (cm). Obstacle thickness.
- 2.4G attenuation (dB): 2.4GHz RF field strength attenuation.
- 5G attenuation (dB): 5GHz RF field strength attenuation.

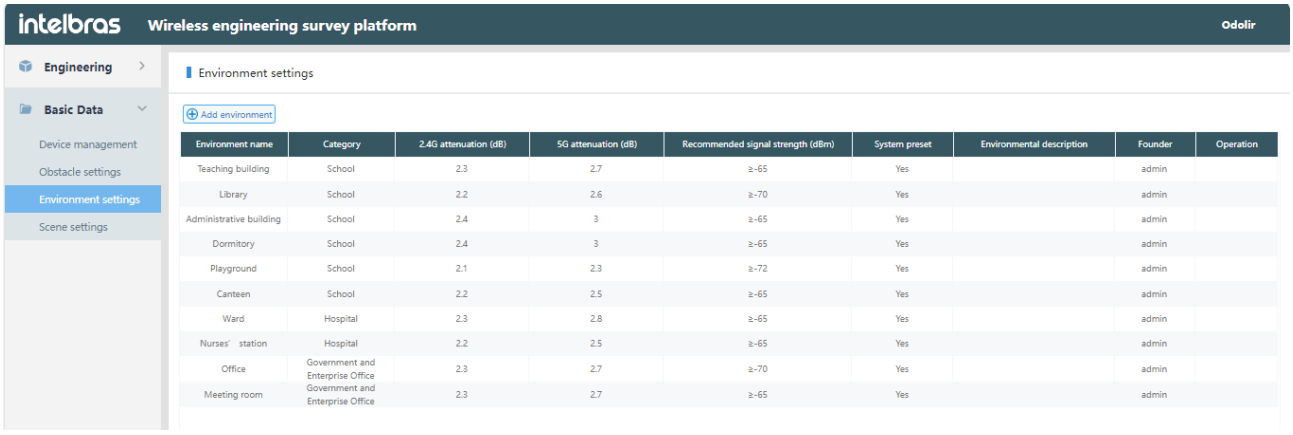
- 6G attenuation (dB): 6GHz RF field strength attenuation.

2.6.3 Environment Settings

Environment settings support user-defined addition, deletion, and modification of environment attributes. The default type of the system cannot be modified or deleted.

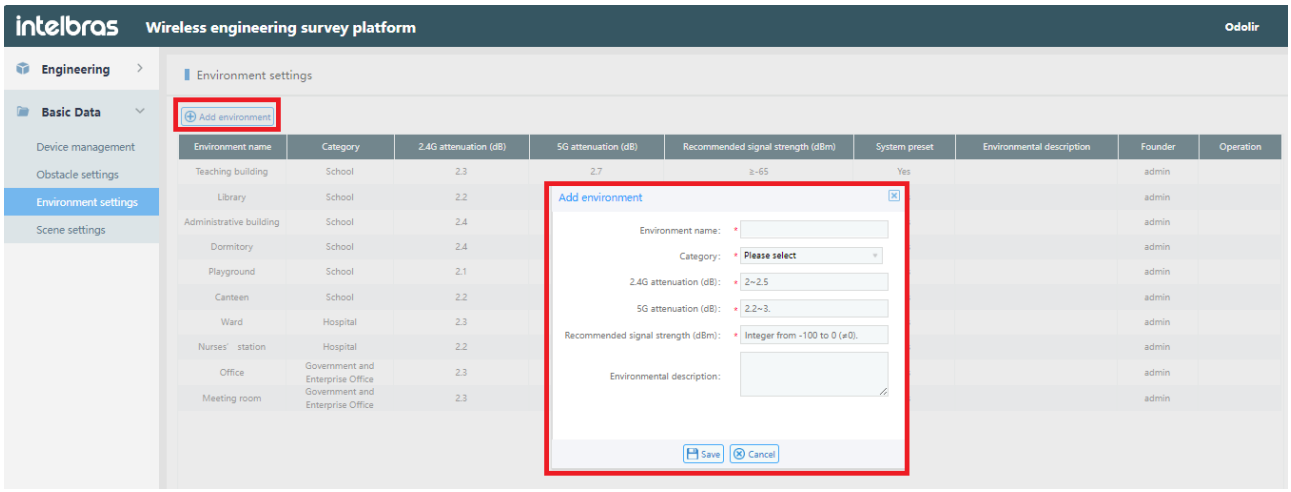
(1) List display: Including environment name (one industry corresponds to multiple environments), industry classification (9 categories: school, hospital, government office, hotel, airport, stadium, production scene, outdoor, others), 2.4G attenuation (dB), 5G attenuation (dB), recommended signal strength (dBm), setting status, environment description, operation (modification, deletion).

Figure 5-36 Environment settings



(2) Add environment: The pop-up add environment page contains the environment name, environment description, attenuation coefficient, and default minimum field strength. All fields are required except the environment description.

Figure 5-37 Add environment



(3) Modify environment: The pop-up window to modify the environment page contains the environment name, environment description, attenuation coefficient, and default minimum field strength. All fields are required except the environment description.

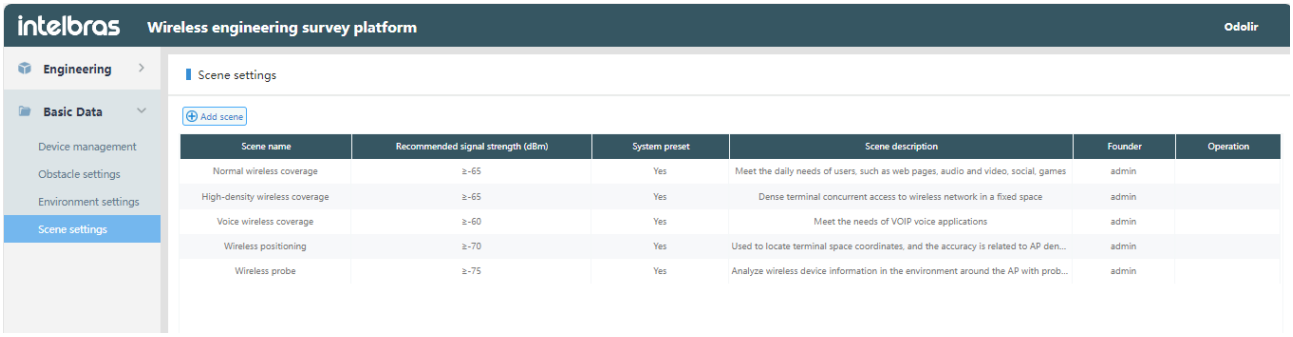
(4) Delete environment: The default environment of the system cannot be deleted.

2.6.4 Application scenario settings

Application scenario settings support user-defined addition, deletion, and modification of environment attributes. The default scenario of the system cannot be modified or deleted.

(1) List display: including scene name, suggested signal strength, system preset, scene description, operation (modify, delete).

Figure 5-38 Application scenario settings



(2) Add scene: The popup add scene page contains scene name, scene description, and default minimum field strength, except for the scene description, which are required fields.

(3) Modify scene: Popup window to modify scene page, including scene name, scene description, default minimum field strength, except for scene description are required fields.

(4) Delete environment: The default environment of the system cannot be deleted.

2.7 Standard mode flow of Drawing Scheme

(1) New project (required): First enter the system to create a new project. Fill in the project name and project description.

(2) New scheme (required): After the project is newly created, click the OK button to turn to the project scheme page of the newly created project site. At this time, the page only has the root node and project name.

- At this time, you can create a new group or plan at the root node. You need to select the environment when you create a new plan.
- You can also continue to create a new group or scheme under the newly created group. After you click OK to create a new scheme, a new browser tab opens the scheme designer.

(3) Import engineering survey plan (required): The scheme designer page is the core page of the entire cloud engineering survey system. First, import the engineering survey plan and select the original engineering survey plan for the target engineering survey.

(4) Set the scale (required): Draw a line corresponding to the actual length on the engineering survey plan. After setting the scale, the heat map rendering will reflect the rendering length according to the set scale.

(5) Scene setting (optional): The user can set what kind of scene an area is in the engineering survey map, and one scene can set multiple scenes. When the scenes overlap, the minimum default field strength is the highest. The default minimum field strength of the scene does not conflict with the default minimum field strength of the entire environment. When a scene exists, the scene prevails.

(6) Obstacle settings (required): According to the original engineering survey plan, the corresponding obstacles need to be drawn in the drawing area. You can choose the type of obstacle (supporting customization) and shape (straight line, polyline, rectangle).

(7) Equipment deployment (required): According to the size of the actual engineering survey object and their own experience, the engineering survey personnel lay out the AP equipment at the corresponding location.

(8) Test point deployment (optional): According to the signal strength and experience, the engineering surveyor marks the test points on the engineering survey plan, which is convenient for the inspection personnel to find the test points purposefully during the acceptance.

(9) Rendering range (required): according to the actual needs, the engineers select the area to be rendered.

(10) Refresh (required): Click the refresh icon  at the top right of the page to refresh the rendering.

(11) Turn on simulation (required): After the obstacles and AP devices are deployed, turn on the simulation, and you can see the simulation map formed after rendering, which represents the signal intensity according to the color gradient. At the same time, you can select the frequency band, the type of simulation picture, and the color system.

2.8 Wizard mode flow of Drawing Scheme

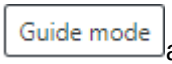
(1) New project (required): First enter the system to create a new project. Fill in the project name and project description.

(2) New scheme (required): After the project is newly created, click the OK button to turn to the project scheme page of the newly created project site. At this time, the page only has the root node and project name.

- At this time, you can create a new group or plan at the root node. You need to select the environment when you create a new plan.
- You can also continue to create a new group or scheme under the newly created group. After you click OK to create a new scheme, a new browser tab opens the scheme designer.

(3) Import engineering survey plan (required): The scheme designer page is the core page of the entire cloud engineering survey system. First, import the engineering survey plan and select the original engineering survey plan for the target engineering survey.

(4) Set the scale (required): Draw a line corresponding to the actual length on the engineering survey plan. After setting the scale, the heat map rendering will reflect the rendering length according to the set scale.

(5) Switch to Wizard mode: click the switch icon 

at the top left of the page to enter Wizard mode.

(6) Obstacle settings (required): According to the original engineering survey plan, the corresponding obstacles need to be drawn in the drawing area. You can choose the type of obstacle (supporting customization) and shape (straight line, polyline, rectangle). Click the icon 

to enter device deployment.

(7) Equipment deployment (required): According to the size of the actual engineering survey object and their own experience, the engineering survey personnel lay out the AP equipment at the corresponding location. Click the icon 

to enter draw render range.

(8) Rendering range (required): according to the actual needs, the engineers select the area to be rendered. Click the icon 

to enter heat map rendering.

(9) Heat map rendering: according to the actual needs, the engineers select the area to be rendered. Click the icon 

to render the heat map. Click the refresh icon  at the top right of the page to refresh the rendering.

(10) Save (required): From the heat map rendering, click the icon 

to enter the next step, and the current drawing information will be saved automatically.

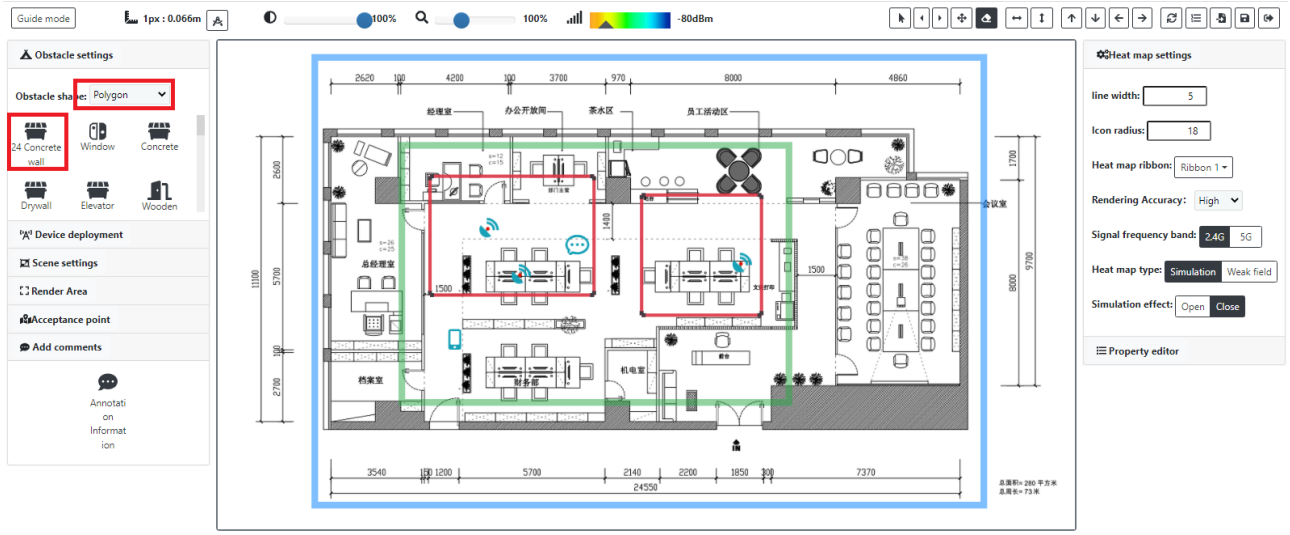
3 Rendering example

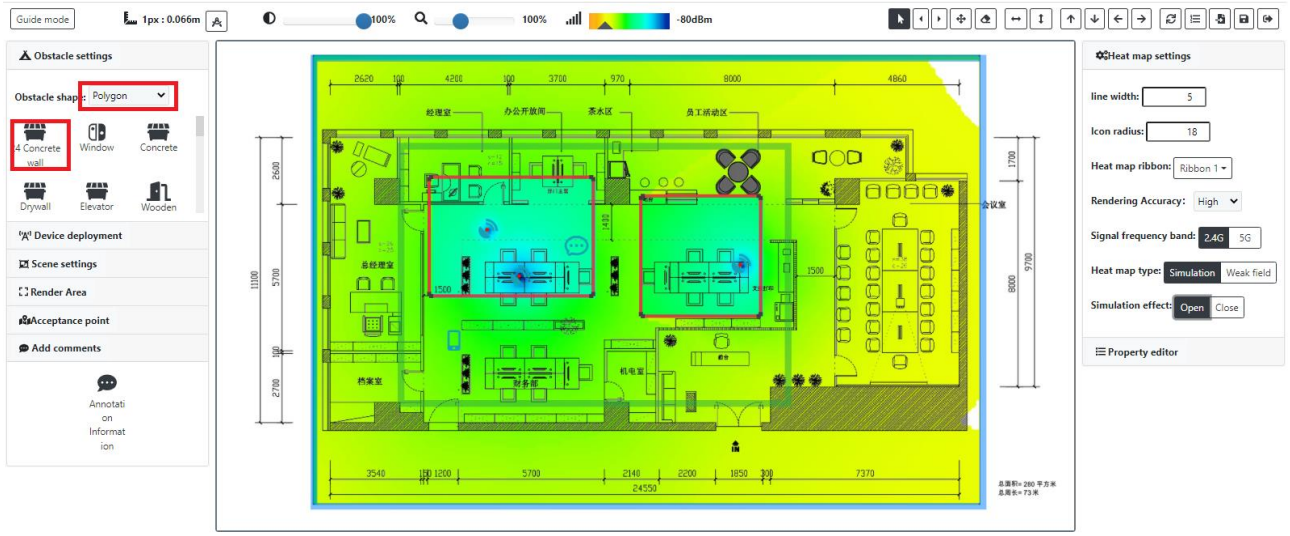
In the INTELBRAS cloud engineering survey, the rendering area is the core which is used to complete signal simulation and obstacle simulation rendering.

Before the deployment of WLANs, engineers could not clearly know the number of devices deployed. Only after surveying and indexing the coverage sites could the signals and numbers of devices such as APs and antennas be determined. At the same time, through surveys and index calculations, the deployment positions of APs and antennas can be determined. These can be simulated through INTELBRAS cloud engineering surveys, which greatly reduces the manpower and material resources invested in engineering surveys.

3.1 Set the obstacle type to concrete, rectangular

Figure 6-1 Rectangular 2.4GHz concrete





3.2 Set the obstacle type to glass window, straight

Figure 6-2 Straight 2.4GHz glass window