

SmartPTT

Indoor Positioning Service

October 2018

Indoor Tracking in SmartPTT Configurator

Big organizations with huge premises require constant control over their employees displacement inside buildings. For this purpose Indoor Tracking system was implemented.

Indoor Tracking system allows getting data from special beacons and transmitting it to *SmartPTT Dispatcher*.

Currently, SmartPTT system supports the following technologies and products:

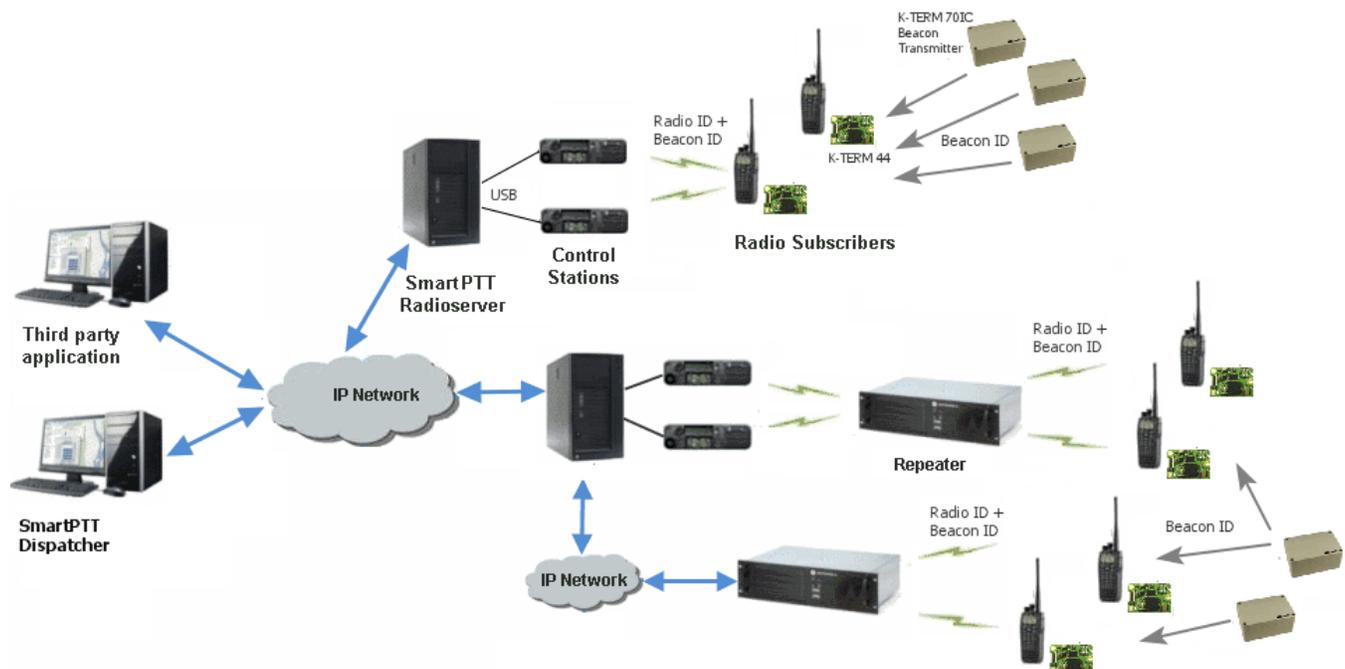
- **iBeacon technology:** With MOTOTRBO radios with the firmware version 2.6 and above, and beacons that support iBeacon technology.
- **BluFi Wireless:** With option boards (Connect-RTL S RF800) and beacons (Connect-RTL S RF800).
- **Kilchherr Elektronik AG:** With option boards (K-TERM 44) and beacons (K-TERM 70IC Beacon Transmitter).

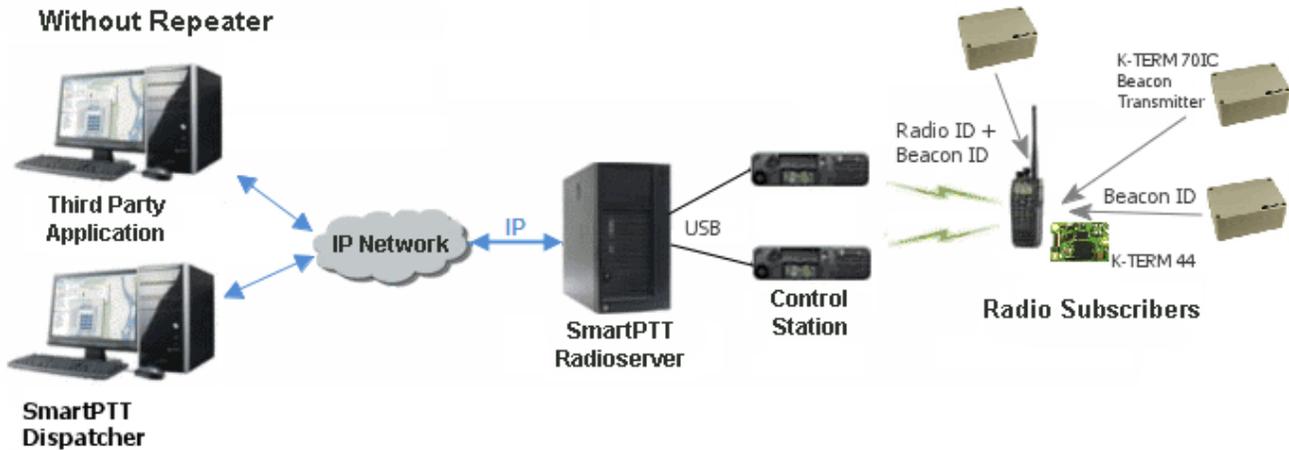
Connect Plus systems support Indoor Tracking based on the iBeacon technology only.

IMPORTANT

Indoor Tracking functionality requires the corresponding license.

The following scheme shows how SmartPTT Radioserver gets radio location data:





iBeacon-based technology scheme

Each installed beacon is transmitting at an interval ranging from a fraction of a second to several minutes the data packages in the following format:

- *iBeacon prefix*: A title of a package
- *UUID*: A unique identifier of the beacon
- *Major*: A group parameter of the beacon
- *Minor*: The individual parameter of the beacon in the group
- *Tx power*: The strength of the signal, transmitting by the beacon

The radio with the preconfigured CPS settings receives the data packages from the beacons which identifiers (UUID) are set in the CPS settings, and transmits them to SmartPTT Radioserver via repeater or control station.

BluFi scheme

The RF800 beacons operate in a continual **Sleep** → **Transmit** → **Sleep** → **Transmit** mode. When a beacon awakes from its sleep cycle, it transmits its allocated code during the transmit phase, and then returns to sleep phase.

Portable radios operate in the **Sleep** → **Listen** → **Sleep** → **Listen** mode. When a portable radio awakes from its sleep cycle, it listens for any transmitted beacon codes during its listen phase, and then determines the current active beacon. If a new active beacon is different from the previous active beacon, a beacon update status message (a special TMS message) is sent via the radio

network to SmartPTT Radioserver. For information on BluFi beacons and option boards, see the manufacturer's documentation on the products.

NOTE

Connect-RTLS RF800 option boards transmit data in TMS messages. Therefore, it is necessary to have TMS enabled.

Kilchherr scheme

Each beacon installed is continually transmitting commands, like *Detect*, *Keep Alive*, *Lost*, which contain unique **Beacon ID** (set in K-Term CPS). When a radio gets closer to the beacon, the built-in option board receives **Beacon ID** and then transmits it with the **Radio ID** to SmartPTT Radioserver via repeater or control station. Further data processing can be handled by *SmartPTT Dispatcher* or any third party application, connected to the radioserver using API. For information on Kilchherr beacons and option boards, For information on the manufacturer's documentation on the products.

WARNING

For the **Kilchherr** and **BluFi** option boards, in network systems with MNIS service enabled, make sure that the ID set in the option board settings (where data is to be sent) should match **MNIS Application ID**. In network systems without MNIS service enabled, any ID can be set in the option board settings (where data is to be sent). However, it is necessary that **Data call confirmed** should be unselected in the radio settings. In networks based on control stations it is necessary that the ID set in the option board settings should match **Radio ID** set in the control station settings.

To use the **Indoor Tracking** feature based on the iBeacon technology, ensure that the MOTOTRBO radio meets the following requirements:

- The radio supports Indoor-positioning
- The radio is configured properly in MOTOTRBO CPS

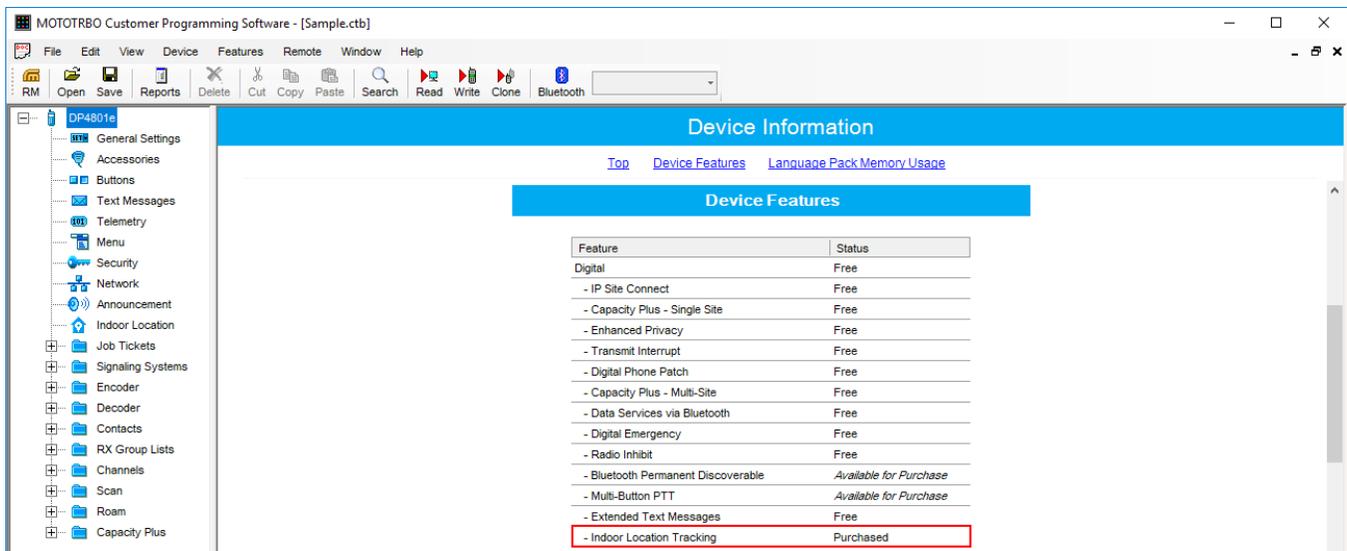
1.1 Configuring Indoor Tracking in MOTOTRBO CPS

Below is a description of the Indoor settings only.

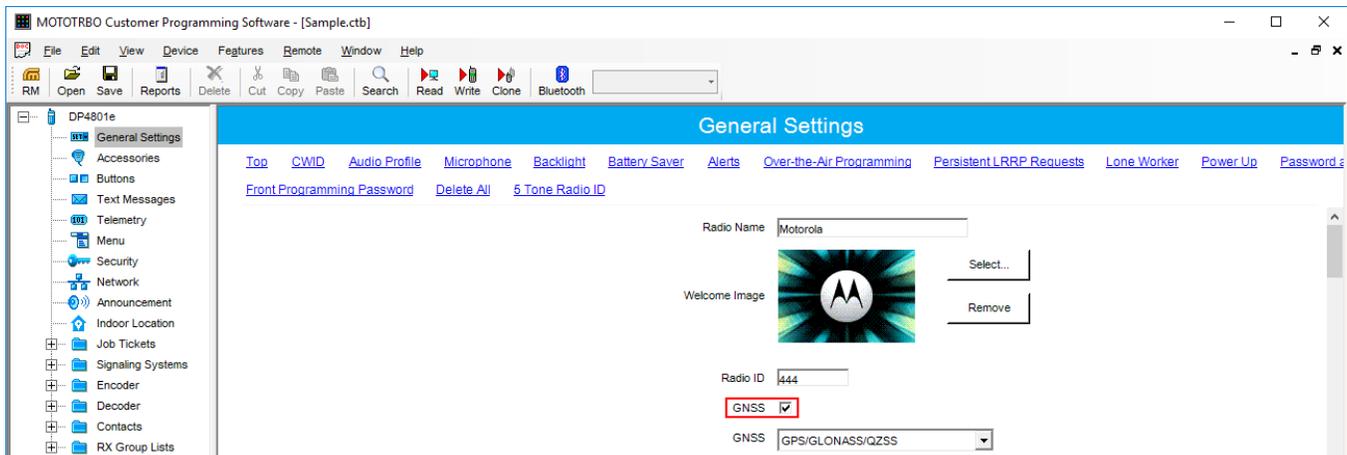
For information on programming the MOTOTRBO equipment, see *SmartPTT Develop Installation & Configuration Guide*.

To configure the MOTOTRBO radio for use of the Indoor Tracking feature based on the iBeacon technology, follow these steps:

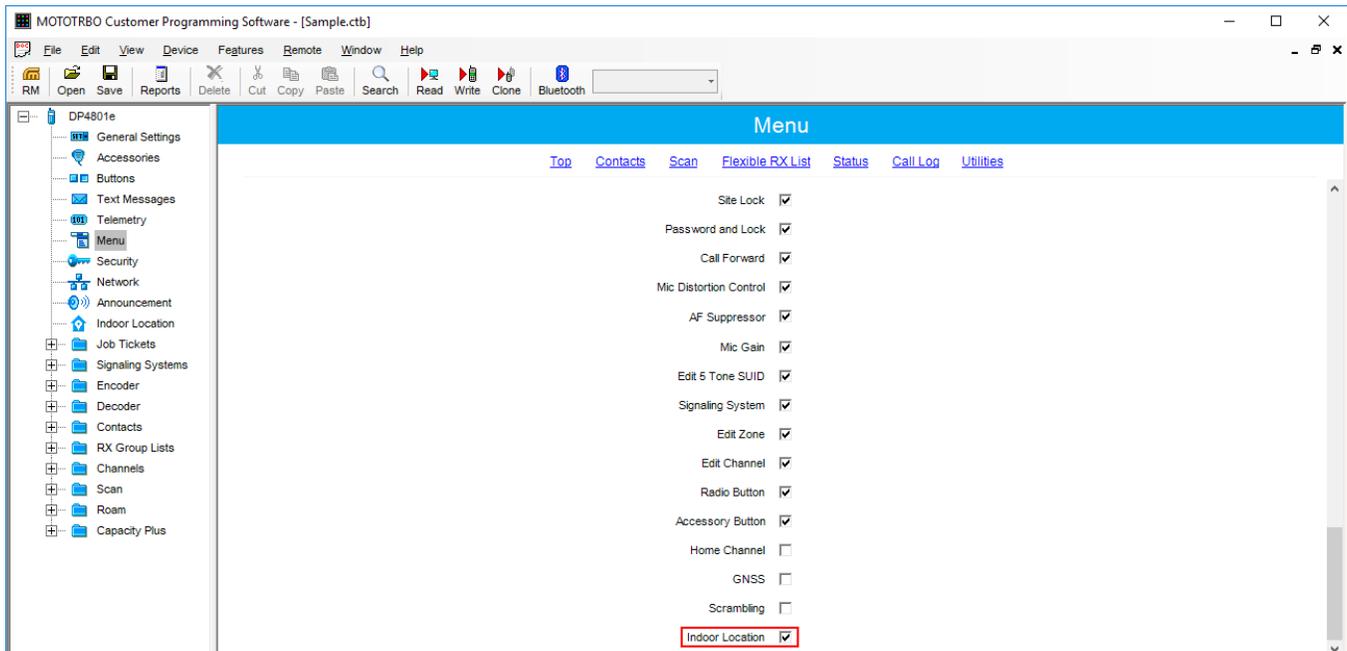
1. Launch MOTOTRBO CPS with the 13.0 version or above, and perform the following actions:
 - a. In the left pane, select the desired radio and in the **Device Information** tab verify the **Indoor Location Tracking** field has the *Purchased* value.



- b. In the left pane, select **General Settings**. In the **General Settings** window, select the **GNSS** check box.



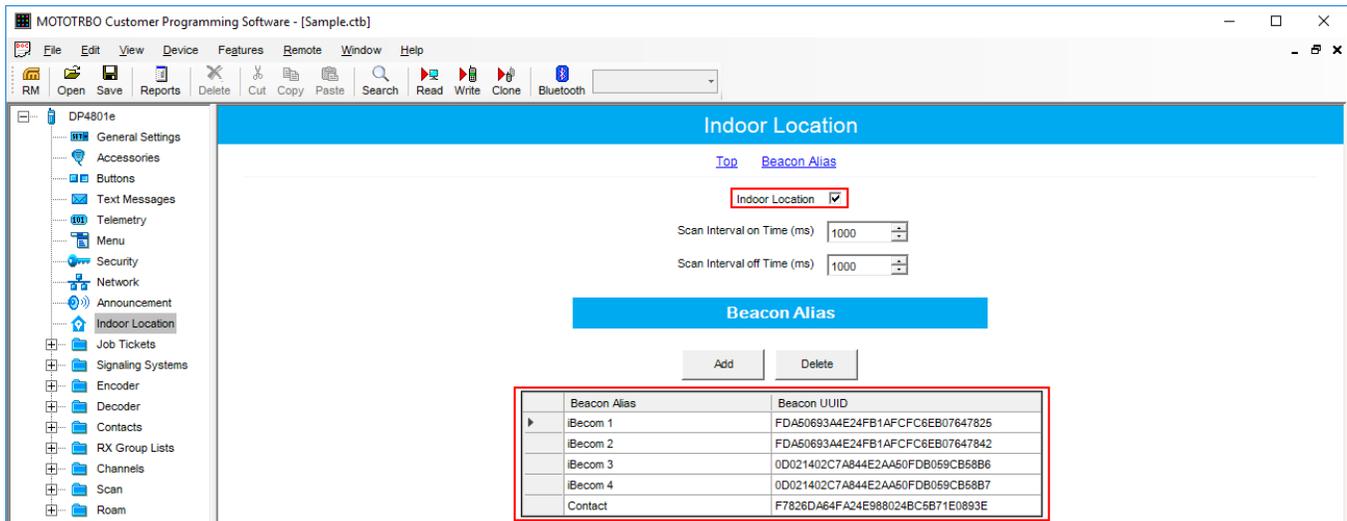
- c. In the left pane, select **Menu**. In the **Utilities** area of the **Menu** pane, select the **Indoor Location** check box.



- d. In the left pane, select **Network**. In the **Bluetooth** area of the **Network** pane, select the **Enable** check box.



- e. In the left pane, select **Indoor Location**. In the **Indoor Location** pane, select the **Indoor Location** check box.

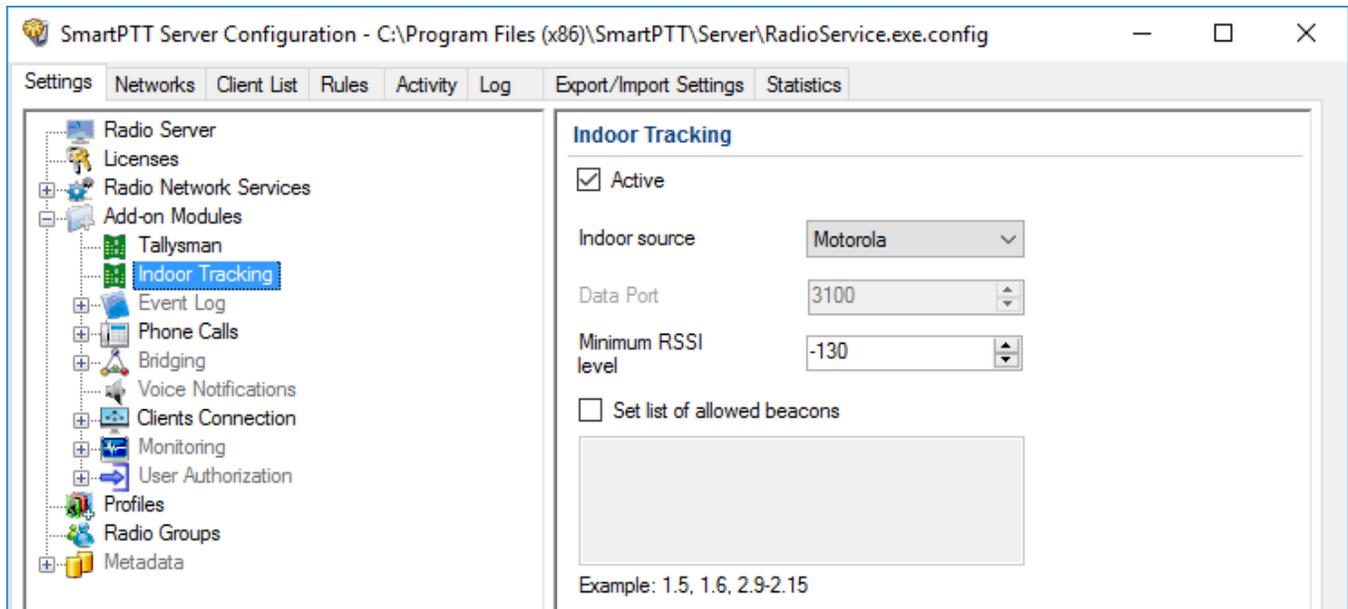


- f. In the **Beacon Alias** area, add the beacons and specify their names and identifiers (UUID).
2. Configure Bluetooth in the radio to activate Indoor-positioning. For that, with use of radio menu buttons, perform the following actions:
 - a. Set the parameter **Main Menu** → **Bluetooth** → **My Status** → **On**.
 - b. Set the parameter **Main Menu** → **Bluetooth** → **Indoor Location** → **Enabled**.

1.2 Configuring Indoor Tracking

To configure **Indoor Tracking** in SmartPTT Radioserver Configurator, follow these steps:

1. In the left pane of *SmartPTT Radioserver Configurator*, select **Indoor Tracking**.



2. In the **Indoor Tracking** pane, perform the following actions:
 - a. Select the **Active** check box to activate Indoor Tracking.
 - b. From the **Indoor source** list, select the desired Indoor-positioning technology:
 - *Motorola*: If you use iBeacon technology
 - *BluFi*: If you use BluFi Wireless technology
 - *Kilchherr*: If you use Kilchherr Elektronik AG technology
3. Only for *Kilchherr* technology: In the **Data Port**, enter the UDP port for listening to Beacon ID.
4. Only for *iBeacon* technology: In the **Minimum RSSI level**, enter the minimum value of the signal strength, that radio receives from the beacon.

NOTE

SmartPTT Radioserver does not process the signals with power that is lower than the specified level.

5. *Optional:* Select the **Set list of allowed beacons** check box and specify the numbers of the beacons which data must be processed by SmartPTT Radioserver. Use the following format:
- If you use *Motorola* technology: Specify the numbers of the beacons in the *Major.Minor* format, where the *Major* is the beacons number, *Minor* is the individual number of the beacon in the group.
 - For the *BluFi* or *Kilchherr* technology: Specify the Beacon IDs set in the beacons parameters.

NOTE

If the **Set list of allowed beacons** check box is not selected, the radioserver processes data from all the beacons.

Indoor Tracking in SmartPTT Dispatcher

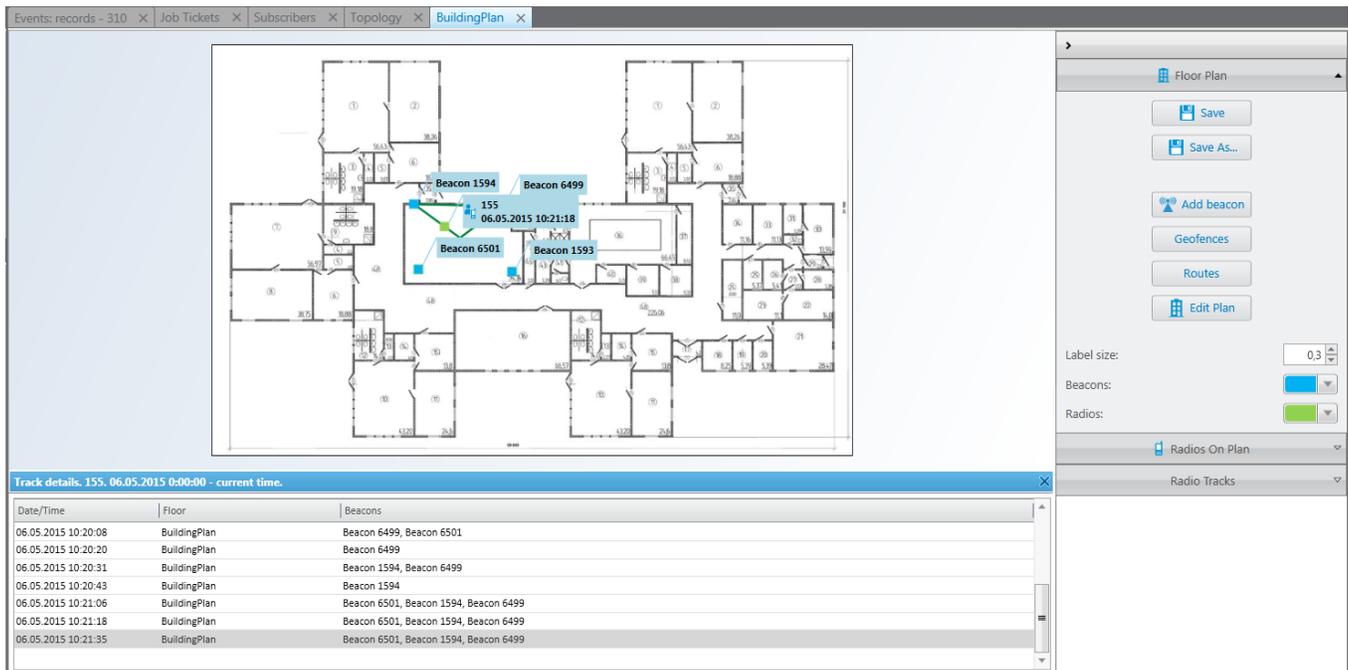
Big organizations with huge premises require constant control over their employees' displacement inside buildings. For this purpose Indoor Tracking system was implemented. Indoor Tracking system allows getting data from special beacons and transmitting it to SmartPTT Dispatcher or any other client application using API. Contact our technical support (<http://support.smartptt.com/hc/en-us>) for SmartPTT Client API documentation.

Currently, SmartPTT system supports the following technologies and products:

- **iBeacon technology:** With the use of MOTOTRBO radios with the firmware version 2.6 and above and the beacons that support iBeacon technology
- **Blufi option boards (RF800):** With special beacons (Connect-RTLS RF800)
- **Kilchherr option boards (K-TERM 44):** With special beacons (K-TERM 70IC Beacon Transmitter)

NOTE

The **Indoor Tracking** feature is available only for MOTOTRBO radios with the firmware version 2.6 and above or for radios with special option boards (see above). Also, it is necessary to configure special settings in SmartPTT Radioserver Configurator and SmartPTT Dispatcher. The required settings for SmartPTT Radioserver are described in the **Indoor Tracking** section of the SmartPTT Radioserver Configurator help file.



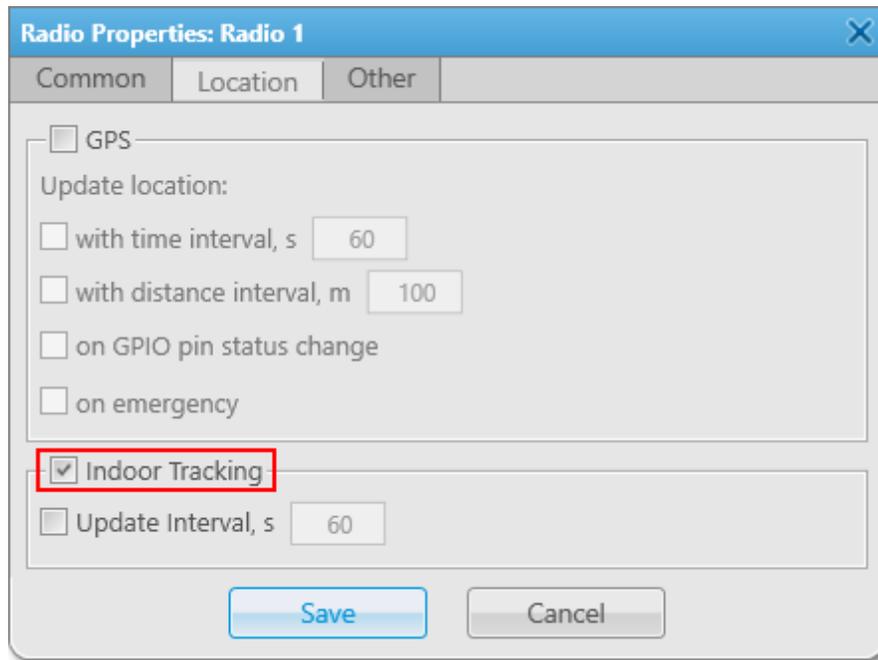
The screenshot displays the SmartPTT Dispatcher interface. The main window shows a floor plan with several beacons marked: Beacon 1594, Beacon 6499, Beacon 6501, and Beacon 1593. A track is visible with a timestamp of 06.05.2015 10:21:18. The interface includes a top menu bar with options like 'Events: records - 310', 'Job Tickets', 'Subscribers', 'Topology', and 'BuildingPlan'. On the right side, there is a 'Floor Plan' panel with buttons for 'Save', 'Save As...', 'Add beacon', 'Geofences', 'Routes', and 'Edit Plan'. Below the floor plan, there is a 'Track details' table for the selected track.

Date/Time	Floor	Beacons
06.05.2015 10:20:08	BuildingPlan	Beacon 6499, Beacon 6501
06.05.2015 10:20:20	BuildingPlan	Beacon 6499
06.05.2015 10:20:31	BuildingPlan	Beacon 1594, Beacon 6499
06.05.2015 10:20:43	BuildingPlan	Beacon 1594
06.05.2015 10:21:06	BuildingPlan	Beacon 6501, Beacon 1594, Beacon 6499
06.05.2015 10:21:18	BuildingPlan	Beacon 6501, Beacon 1594, Beacon 6499
06.05.2015 10:21:35	BuildingPlan	Beacon 6501, Beacon 1594, Beacon 6499

Indoor Tracking in SmartPTT Dispatcher

If the **Show radio user name** check box is selected in the **General Settings** window, the user authorization service is activated, and users are added on SmartPTT Radioserver, on the radio label the name of the user authorized on the radio is displayed next to the radio name in the parentheses.

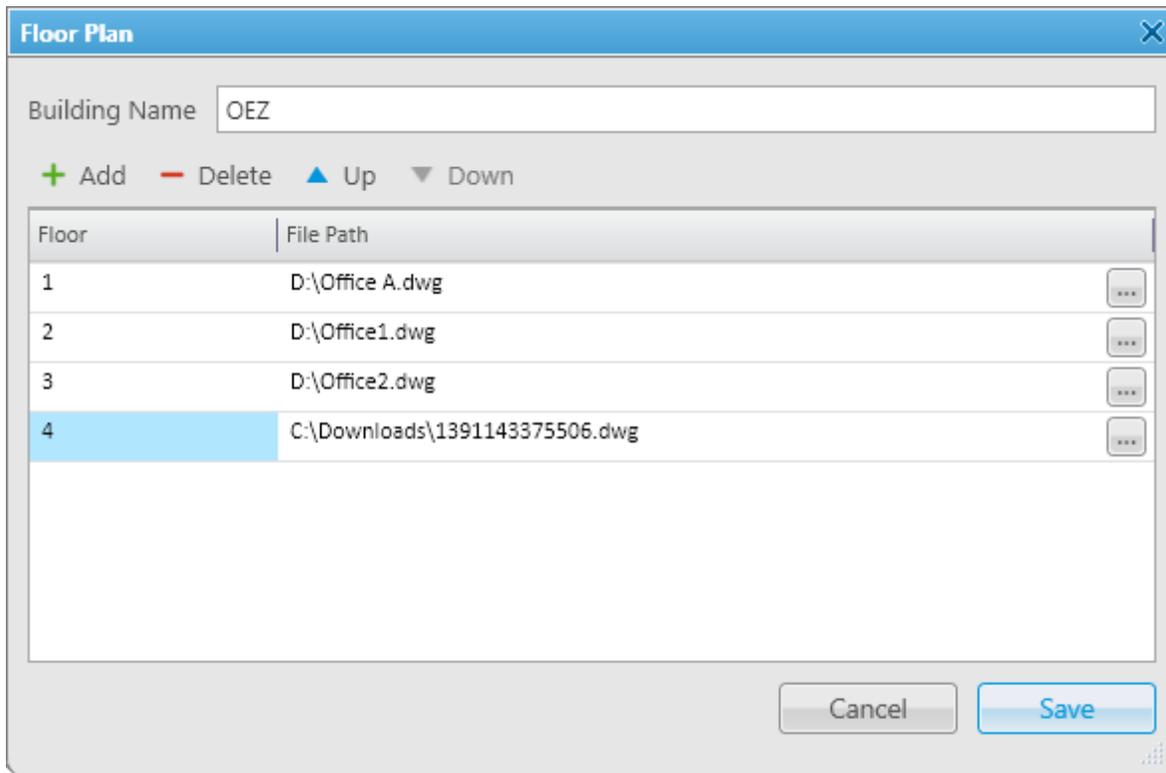
To enable Indoor support for a radio in SmartPTT Dispatcher, open the **Properties** window of the radio and in the **Location** tab select **Indoor Tracking**.



NOTE

If you use the *Motorola* source (iBeacon technology), the **Update Interval** box must be selected and specified together with the **Indoor Tracking** box for enabling Indoor support for a radio.

To create a building plan, expand the **Map** menu on the menu bar of the SmartPTT Dispatcher window and click **Indoor Tracking** → **New Building Map**. In the **Floor Plan** window you can create a plan of the building floor or of a multi-store building.



Building Name: A name of the building plan.

To add a floor of a building, click the **Add** button. To remove a floor of a building, select it from the list and click **Delete**. To change the floor order inside the building, use the **Up** and **Down** buttons.

Floor: A name or an ordinal number of a floor in a building. To change the name of the floor, click the old name in the **Floor** box and type a new value.

File Path: A path to the floor plan file. You can use a floor plan in the .dwg format or a raster image. To attach a plan to the floor, click the  button and select the required file.

NOTE

.dwg (drawing) is a binary file format used for storing two and three dimensional design data and metadata. It is the native format for several CAD packages including nanoCAD, AutoCAD, IntelliCAD.

Save: You can save the floor or the building plan changes to the .splanx (archive) format.

To open a building plan, expand the **Map** menu on the menu bar of the SmartPTT Dispatcher window and click **Indoor Tracking** → **Open Indoor Map**. To control more than one building at the same time in SmartPTT Dispatcher, you can open several **Indoor Tracking** panels.

Building Floor Plan

Save: You can save the building plan changes to a .splanx file.

Save As: You can save a copy of the building plan with another name.

View Mode (2D or 3D): A mapping of the building plan in a two- or three-dimensional form. This feature is available only for floor plans in the .dwg format.

Add Beacon: You can add a beacon to the building plan.

For that, in the **Beacon Settings** window specify the beacon number and name in the corresponding boxes and click **OK**. The beacon icon  appears instead of the mouse cursor. Place it on the map where the beacon is located and left click. If you use the *Motorola* source, specify the number of the beacon in the **Beacon Number** box in the *Major.Minor* format, where the *Major* value is separated from the *Minor* value by a dot. *Major* stands for the group number of the beacons and *Minor* stands for the individual number of the beacon in the group.

If you use the *BluFi* or *Kilchherr* source, specify the **Beacon IDs** in the **Beacon Number** box. If the beacon name is not specified in the **Beacon Name** box, the value from the **Beacon Number** box will be displayed as the beacon name on the building plan. To remove the beacon from the plan, double-click on the beacon and in the window that appears click **Delete**.

Geofences: Allows you to unite the existing beacons to control the radios moving about the building. These geofences are used in Indoor positioning rules.

Routes: Allows you to create routes for radios. These routes are used in Indoor positioning rules.

Edit Plan: Opens the **Floor Plan** window that allows you to change the floor name, the floor order inside the building, or the floor plan file.

Grid Size: The grid size of the building plan. For building plans based on raster images, the **Grid Size** option is not available.

Label Size: The size of the radio and beacon labels displayed on the building plan.

Beacons: Select a color for a beacon label.

Radios: Select a color for a radio label.

Radios on Plan: A list of radios which support the **Indoor Tracking** feature. Select the check box, to display the radio labels on the building plan.

Radio Tracks: Here you can record tracks of radios and watch them in real time, or check old records. To watch the radio move about the building, click **Add Track**. In the window that appears specify the following parameters:

Source: The radioserver whose data will be used for building a track. If the drop-down list is empty, check that Event Log is activated in SmartPTT Radioserver Configurator.

Radio: Radio ID or name.

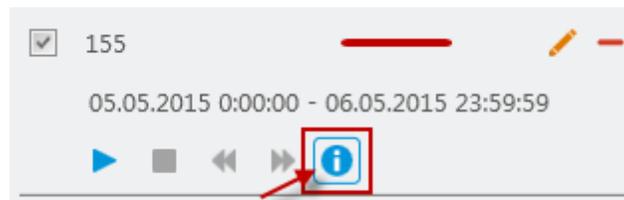
User: User name.

Color: The color of the future radio track.

Start Date: Start time and date of the track record.

End Date: End time and date of the track record. To watch the radio moving in real time, select **Update in real time**.

Show All: Shows tracks of all the radios from the **Radios on Plan** list. You can see details of each track. To open **Track details**, click :



Clear All: Removes all the track records displayed at the moment.

The following buttons allow to control the way the building plan is displayed:



Zooming up the marked area of the building plan. Click the button, then left-click on the building plan and mark the necessary area.



Zooming up or zooming out the entire building plan. To zoom in, click the button and witholding the button pressed move the mouse pointer up. To zoom out – move the mouse pointer down. Also, use the wheel button to change the scale of the building plan.



Moving the building plan. Click the button and witholding the button pressed relocate the plan.



Fits the scale of the building plan to the size of the **Indoor Tracking Overview Map** panel.

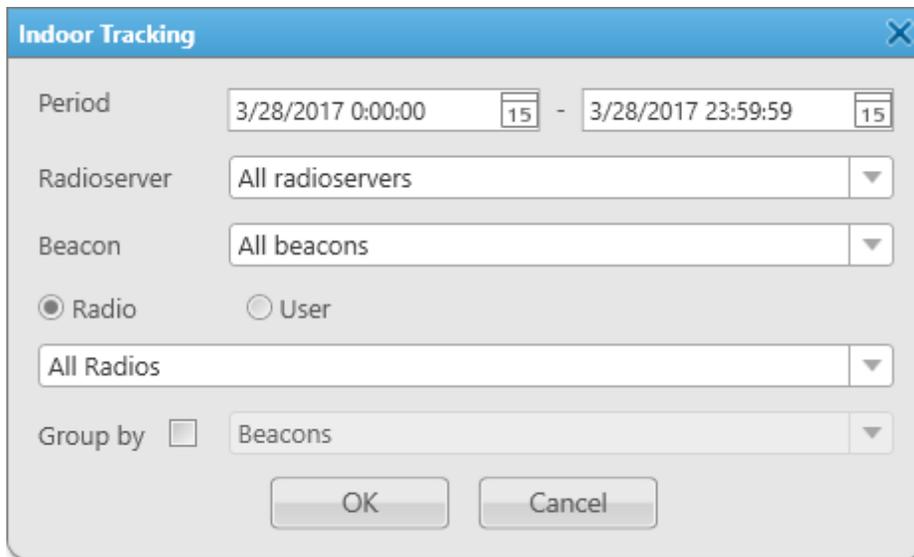
The following object is available for three-dimensional building plans only. It allows to change an angle of the displayed building plan.



2.1 Indoor Tracking Reports

The **Indoor Tracking** report was designed to provide the dispatcher with consolidated information on radio movements inside buildings, based on beacon data.

To create the report expand the **Reports** menu, and select **Indoor Tracking**. The **Indoor Tracking** window appears.



Period: Defines the time frame for the report data.

Radioserver: Selects the available radioserver, whose database will be used as a data source.

Beacon: Selects the particular beacon or all beacons.

Radio: Defines the radio for which the report is to be generated. The list of radios is taken from the connected database.

User: Defines the radio user for which the report is to be generated.

Define the structure of the report by grouping it by beacons or radios.

Then click **OK** to build the report.

Example

Indoor Tracking

from 6/19/2014 12:00:00 AM to 6/19/2014 11:59:59 PM

Radio	Beacons	Radioserver	Date/Time	Message
12.0.0.155				
12.0.0.155	6499	Radioserver_Tomsk	6/19/2014 4:45:49 PM	Signal active
12.0.0.155	6501	Radioserver_Tomsk	6/19/2014 4:45:49 PM	Signal active
12.0.0.155	1594	Radioserver_Tomsk	6/19/2014 4:45:49 PM	Signal active
12.0.0.155	6499,1594,6501	Radioserver_Tomsk	6/19/2014 4:45:49 PM	Radio position
12.0.0.155	6499,1594,6501	Radioserver_Tomsk	6/19/2014 4:45:49 PM	Radio position
12.0.0.155	6499	Radioserver_Tomsk	6/19/2014 4:43:47 PM	Signal active
12.0.0.155	6499,1594,6501	Radioserver_Tomsk	6/19/2014 4:41:50 PM	Radio position
12.0.0.155	6501	Radioserver_Tomsk	6/19/2014 4:41:50 PM	Signal active
12.0.0.155	1594	Radioserver_Tomsk	6/19/2014 4:41:50 PM	Signal active
12.0.0.155	6499	Radioserver_Tomsk	6/19/2014 4:41:50 PM	Signal active
12.0.0.155	6499,1594,6501	Radioserver_Tomsk	6/19/2014 4:41:38 PM	Radio position
12.0.0.155	6499,1594,6501	Radioserver_Tomsk	6/19/2014 4:39:56 PM	Radio position
12.0.0.155	6499	Radioserver_Tomsk	6/19/2014 4:39:56 PM	Signal active
12.0.0.155	1594	Radioserver_Tomsk	6/19/2014 4:39:56 PM	Signal active
12.0.0.155	6499,1594,6501	Radioserver_Tomsk	6/19/2014 4:39:56 PM	Radio position
12.0.0.155	6501	Radioserver_Tomsk	6/19/2014 4:39:56 PM	Signal active
12.0.0.155	1594	Radioserver_Tomsk	6/19/2014 4:39:02 PM	Signal active
12.0.0.155	6501	Radioserver_Tomsk	6/19/2014 4:39:02 PM	Signal active
12.0.0.155	1594	Radioserver_Tomsk	6/19/2014 2:19:10 PM	Signal detected
12.0.0.155	6499	Radioserver_Tomsk	6/19/2014 2:18:57 PM	Signal active
12.0.0.155	6501	Radioserver_Tomsk	6/19/2014 2:18:57 PM	Signal active

NOTE

Under the high load conditions of a repeater, the report may contain corrupted beacon IDs.

To resolve the problem of corrupted beacon ID's, it is recommended to perform the following steps:

- Increase the number of acknowledgments sent from the beacon to the radio. In order to do that, increase the values in the **Beacon Sign On count** and **Beacon Sign Off count** boxes in the **K-Term CPS** settings.
- In the Indoor Tracking settings of SmartPTT Radioserver Configurator select the **Specify** list of allowed beacons check box and specify beacon IDs which data must be processed by SmartPTT Radioserver.

If the previous steps do not solve the problem, send your query to our [technical support service](#).

NOTE

N/A is displayed in the **Beacons** column of the report, if a radio leaves the coverage area of a beacon.



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