

Technical Manual RF Mono

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1 Terms and abbreviations

This chapter describes the terms and abbreviations used in this document.

Term	Abbreviation	Explanation
(Hard) Tag	Tag	Passive component, equipped with a pin and lock to allow attachment to garments, which can be detected by the receiver.
(Paper) Label	Label	Passive component, self-adhesive, which can be detected by the receiver.
Antenna	ANT	The mechanical structure (which usually consists of a frame, wires and electronic PCB) to allow proper detection of tags and labels. Also referred to as: pedestal, barrier.
Start frequency	F _s	The start frequency of the transmission band
End frequency	F _e	The end frequency of the transmission band
Device Explorer	Device Explorer	Cross Point Device Explorer Software tool for configuration of Cross Point devices that are connected to the Cross Point Field Bus.
EAS	EAS	Electronic Article Surveillance
Foiled Twisted Pair	FTP	The FTP cable is surrounded by an outer foil shield.
I/O	I/O	Digital Input / Output
Printed Circuit Board	PCB	The electronics
Radio Frequency	RF	Electro Magnetic signals generated by a transmitter and detected by a receiver.
Transceiver	TRX	Electronic device capable of transmitting and receiving RF signals.
Unshielded Twisted Pair	UTP	Common network cable.

2 Introduction

The products mentioned in this manual are Electronic Article Surveillance (EAS) systems based on Radio Frequency (RF) technology operating between 7.6 MHz – 8.6 MHz.

They are manufactured by

Cross Point B.V.
Waanderweg 12
7812 HZ Emmen
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2.1 Description

The RF Mono system is a state-of-the-art anti-shoplifting system, advertising system and visitor counting system and combines a receiver (RX) and transmitter (TX) in one antenna, a so called transceiver (TRX).

2.2 Available RF Mono systems

This technical manual applies to the following RFM systems:

- SOLUS RFM40
- FORTUS RFM40

2.3 Field Bus Network structure

Multiple RF Mono antennas are interconnected with each other using UTP cables and can be connected to the CrossCONNECT Access Point for either local or remote adjustment or service as well as retrieval of counting data.

2.4 Visitor counting

Visitor counting comes with **Optima** models only because bi-directional IR-based visitor counters are installed in these antennas.

Optima models offer the following extra features:

- Automatic antenna arrangement
- Possibility to count visitors per aisle and to determine the direction of movement (in or out of the shop)
- Generate reports on visitor numbers and alarm numbers
- Doorbell function for incoming and/or outgoing customers

2.5 Restrictions and limitations

The following restrictions and limitations must be considered:

2.5.1 AM systems versus RF Mono systems

It is **not** allowed to connect AM systems together with RF Mono systems to the same Field Bus!

On RF Mono systems, pins 3 and 6 are used for synchronization purposes between the antennas, which are based on a completely different signal compared to AM systems.

Connecting AM systems and RF Mono systems to the same Field Bus will result in bad performance and synchronization!

2.5.2 Detection distances

Any specified detection distances are maximum values. Dependent of environmental noise these maximum values might not be achieved and aisle widths need to be reduced to obtain good system performance. See chapter 3 for more details on potential noise sources and installation guidelines.

2.5.3 RF Deactivators

In case RF Deactivators need to be installed in combination with the RF Mono system, it is mandatory to use Cross Point's Checkout RF Deactivators or Connected RF Deactivators. These devices will function properly and without interference in combination with the RF Mono system.



Do not use other brands RF Deactivators, as they will introduce noise and degrade the performance of the RF Mono system.

3 General RF and EAS issues

This chapter covers the various issues related to Radio Frequency and Electronic Article Surveillance systems in general, like:

- Noise sources
- Installation guidelines

3.1 Noise sources

Listed below are various noise sources that might affect the performance of any EAS system. It is strongly advised to either eliminate these noise sources (as far as possible) or maintain the largest possible distance to these noise sources.

The following devices can create or absorb RF noise signals which can reduce the performance of an EAS system:

- An active laptop. The back light in the screen can create a lot of noise which is detected by the EAS system and can reduce the performance dramatically. Make sure to keep laptop computers at least 3 meters away from the antennas.
- Other EAS systems installed nearby (within 20 meters) and operating at the same frequency.
- (Moving) Objects containing metal, like sliding and revolving doors, elevators, escalators, roller shutters, frames, etc.
- Electronic devices, like computers, screens, cash registers, engines, transformers, etc.
- Vertically positioned power cables, both low voltage and high voltage.
- Lights (flashing, fluorescent, halogen, gas-de-charge, LED, etc.).
- Lightning

3.2 Installation guidelines

Listed below are EAS installation guidelines to ensure a properly installed and functioning system. Not following these guidelines might result in less performance of the EAS system.

1. Check the shop entrance/exit carefully for possible noise sources prior to installation. If potential noise sources are found then try to eliminate these sources or pick the best position for the EAS system where the influence of these noise sources will be minimized.
2. If possible, connect one or more antennas and put them in the required position in the entrance/exit **prior to** drilling holes in the floor and bolting the antennas down. Switch the system on and test the performance. In this way the noise level and system sensitivity can be determined and if necessary (in case of high noise or poor sensitivity) the system can be moved to a better position.
3. Install the power supply for the EAS system at least 1m away from the antennas. If the power supply needs to be installed further away from the system make sure to extend the secondary power cable using a proper cable with the same dimensions (3 x 1mm²) and specifications as the original cable (preferably the exact same cable). Extending the power cable with a cable with different dimensions and specifications might result in less performance of the RF mono system.

4. Avoid unnecessary long cables. Run the power supply cables in a direct line to the EAS antennas. Never run power supply cables vertically up the wall within one meter distance of the antennas (never around the entrance/exit doorframe).
5. By default the shielding of shielded cables is not connected to the electronic boards or antenna frames if not stated otherwise in the Connections chapter of this manual. Only in case of high noise and bad performance it is advised to experiment with connecting the shielding to see if these connections will improve the performance.
6. Do not connect more than three (3) transceiver antennas to one (1) power supply.
7. Metal framed doors may never swing between the EAS antennas, as this will distort the energy field of the system in such a way that it might result in high noise, poor detection and potential false alarms.
8. Do not connect unshielded and untwisted cables to the I/O's as this might affect the performance of the EAS system in a negative way.
9. Do not attach any equipment or devices to the antenna frames.
10. Take into account that when using a laptop within two meters of the antennas, the laptop or its power supply might create noise signals. Use a longer cable to create more distance between the laptop and the EAS system.
11. Do not install antennas with less than 50cm distance between them as this will have a negative effect on the performance.
12. Where possible, use conduits to run the cables through. Make sure to use conduits with a sufficient diameter. In some situations you might need to run 3 cables through the conduit. The power supply cable is \varnothing 5mm and the average FTP cable is \varnothing 6mm. When for example 2 power supply cables and 1 FTP cable need to be run through one conduit then this conduit must have a diameter of at least 20mm.
13. A cable tester is required. The various devices are interconnected through FTP cables. Make sure to test the cables prior to plugging them into the RJ-45 connectors on the devices, especially if you're not using pre-assembled cables!
14. It is recommended to use steel anchors (e.g. SPIT EPOMAX resin with zinc coated steel rods) to mount the antenna to the floor. Do not use screws and plugs, as this will not keep the antenna properly fixated to the floor, resulting in tilting antennas and potential loss of performance.

4 Equipment and tools

The following equipment and tools are advised to use when installing and tuning the RF Mono system.

4.1 General installation tools

The general tools required for installation of an EAS system (drills, screwdrivers, cutters, etc.) are not described in detail.

4.2 Laptop computer



To properly adjust the RF Mono system through Cross Point's Device Explorer software, it is required to use a Windows based (laptop) computer.

The following minimal requirements are set for the laptop:

- Intel 1.3GHz or faster processor
- Microsoft Windows 7 with Service Pack 1 (32 bit and 64 bit)
- Microsoft .NET Framework 3.5 Service Pack 1
- 512MB of RAM (1024MB recommended)
- 50MB of available hard-disk space for Device Explorer
- Minimal screen resolution 1024x768 (recommended 1600x1200)
- Video hardware acceleration

4.3 Software

The various antennas are interconnected through the **Cross Point Field Bus** (see chapter 5.2 for further details on the Field bus structure).

To be able to adjust and configure the various devices, **Cross Point Device Explorer** is required.

Please refer to the *Cross Point Device Explorer User Manual* for further details on all features and general usage of this software.

5 Connections

In the following chapters the connections between the various devices are described. Furthermore the Printed Circuit Board (PCB) and its components are explained.

5.1 “A” and “B” side of the antenna

The RF Mono antenna has a front side (A) and a back side (B). These sides are indicated on the visitor counter in the top of the antenna.

The A-side is the side on which the electronic boards can be accessed.

When using the visitor counter (see also chapter 5.7) try to put all antenna’s in the AB-AB pattern, i.e. all antennas should be placed in the same way.

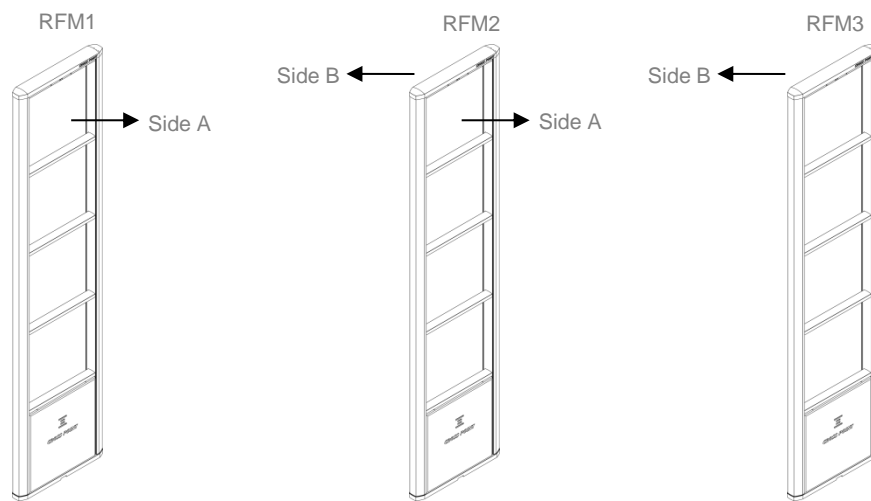


Figure 1: Antenna AB-AB pattern

In the above example the visitor counter side B of RFM1 and side A of RFM2 will be switched off through the software. All other counter sides will be switched on.

5.3 Field Bus connections

The RFM antennas are interconnected through the Field Bus by using preferably FTP cables, because FTP has an advantage to eliminate noise because of the extra shielding.



The Cross Point Field Bus requires the devices to be connected in a “daisy chain” connection. A “star” network is not allowed and will result in poor communication between the devices and the CrossCONNECT Access Point!

When the Field Bus is connected to the Access Point and the Access Point is connected to a Local Area Network (LAN), local servicing and data retrieval is possible. When an internet connection is available, the Access Point can also be connected to the Internet. This will enable remote service and data retrieval.

5.3.1 Bus connections with laptop

Figure 2 shows the Field Bus structure between the various antennas.

All devices are connected to an Access Point, which is connected by Ethernet connection to a laptop or to the local network (LAN) of the store. This enables on-site maintenance and remote service using Cross Point Device Explorer software.

See chapter 7 for further information on how to use the Device Explorer software.

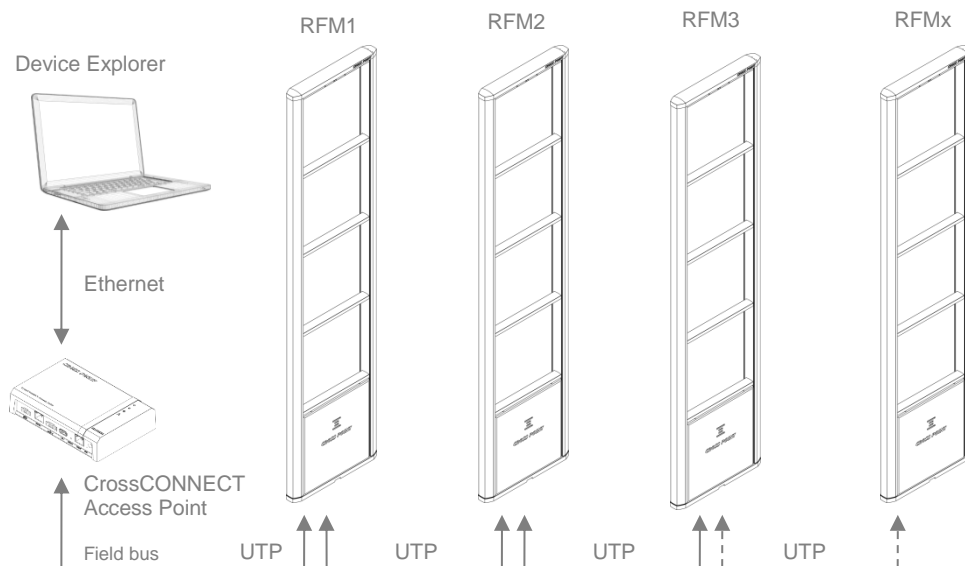


Figure 2: Field Bus structure

5.4 Field Bus termination

For the Field Bus to operate properly, the bus needs to be terminated on the first device and the last device in the bus.

When an antenna is either the first or the last device in the Field Bus, then the bus needs to be terminated on that device.

To terminate the RFM antenna, switch SW1 must be switched to ON. See chapter 5.6 for the position of this switch on the RFM PCB.

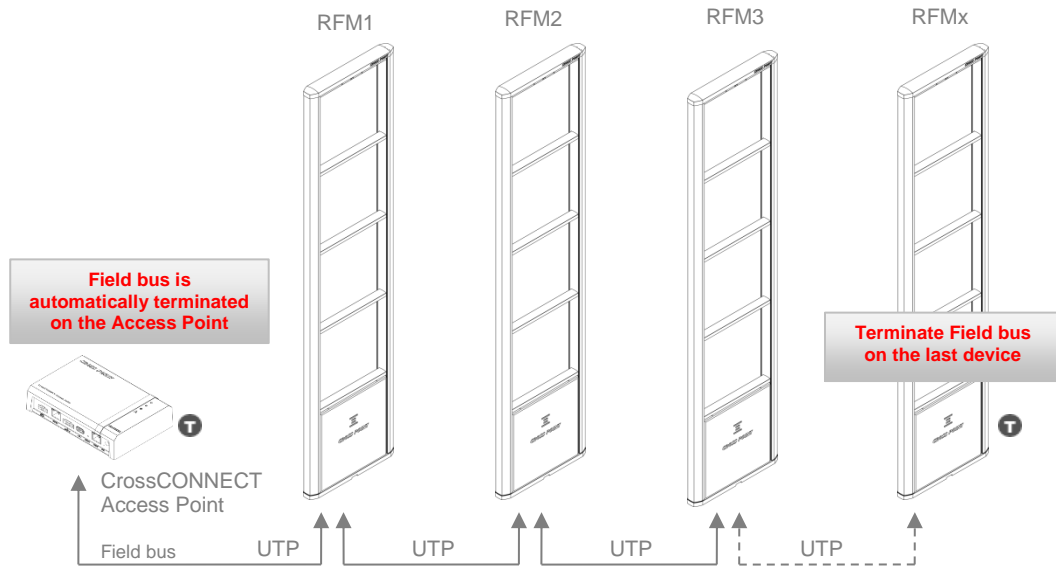


Figure 3: Field Bus termination example during local service or installed CCAP

In case the Access Point is only temporarily connected during installation or local service, the first device in the row must be terminated after the CCAP is disconnected again.

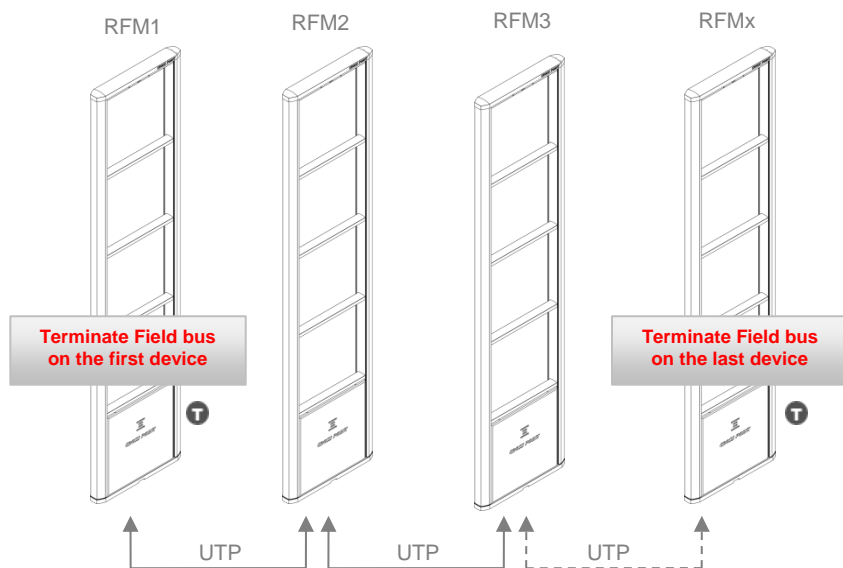


Figure 4: Field bus termination after CCAP is disconnected

5.5 Power supply

The RFM antennas must be powered by connecting the PSU RF SERIES 15VDC-60W.

5.5.1 Power supply specifications

Please refer to the **Instruction Manual Power Supply PSU RF SERIES 15VDC-60W** for information and safety instructions of this power supply.

5.5.2 Power supply restrictions

Local laws and regulations must be respected when installing and servicing this device.

A maximum of three (3) RF Mono antennas can be powered using one (1) power supply. The RF mono antenna, to which the power supply is connected directly, will distribute the power through the Field bus (UTP cable). When an RF Mono receives the power through the UTP cable, it will **not** apply power to the next antenna.

It is not necessary to install separate power supply wiring, as the power supply is distributed by the UTP cable to the next antenna.

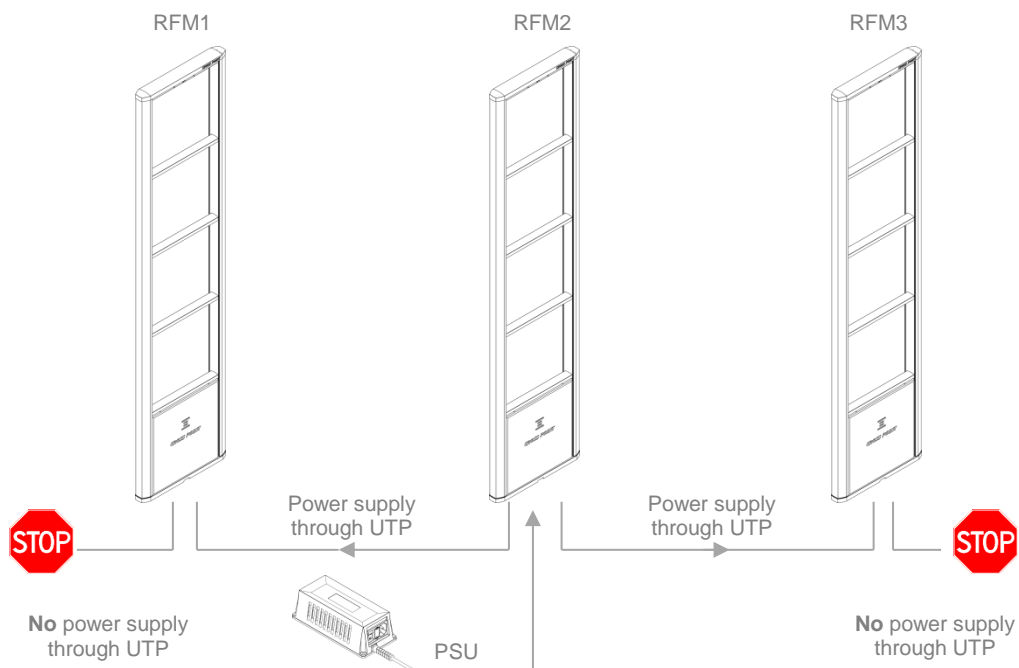


Figure 5: RX Power supply principle



Do not connect more than 3 antennas to 1 power supply unit.

5.6 The RF Mono board

Figure 6 shows the RF Mono PCB and its available components.

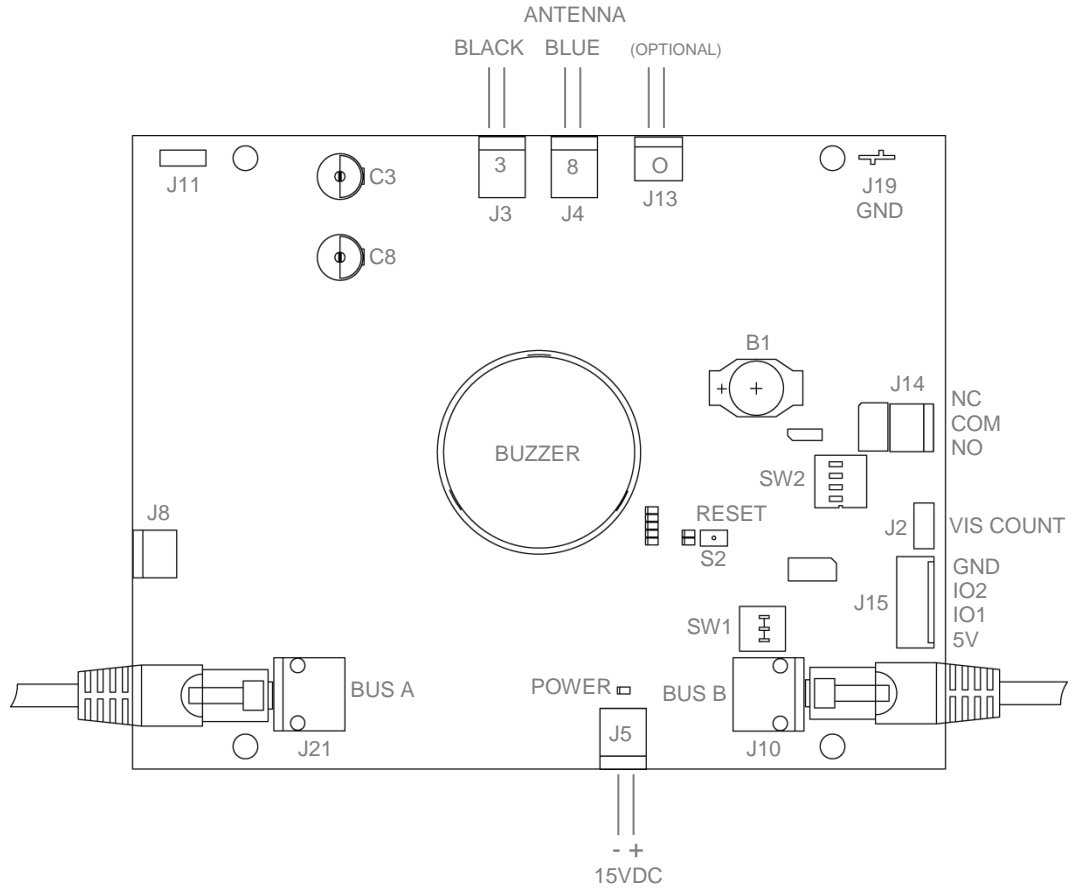


Figure 6: The RF Mono Printed Circuit Board

5.6.1.1 RF Mono PCB Components

Table 1 shows the RF Mono PCB components and a description of their function.

Component	Function
ANTENNA	Antenna output connectors:
J3	3-loop: black wire
J4	2-loop: blue wire
J13	1-loop: white, white/grey or grey wire (optionally connected)
POWER	Power on/off LED indicator
J5	15VDC Power supply input
C3 and C8	Antenna tuning capacitors

VIS COUNT J2	Visitors counter connector. Connect the cable of the visitor counter to this connector.
J21	RS-485 Bus A connector for RJ45 connection. Allows the board to be connected to the Field bus.
J10	RS-485 Bus B connector for RJ45 connection. Allows the board to be connected to the Field bus. If this TRX board is not the last board in the bus, then J2 must be used to connect the RS-485 bus to the next board (daisy chain).
J14	RELAY outputs (NC, COM & NO). Allows connection of other external devices, like lamps or buzzers. Relay max. ratings: 30VDC/1A
RESET S2	Reset button. Pressing this button will result in a hardware reset of this board. This might temporarily affect the synchronization with other RFM antennas.
SW1	Termination of the Field bus. The Field bus needs to be terminated properly to avoid signal reflections which can cause bad communication. The first and last devices in the Field bus need to terminate the bus.
SW2	Reserved
B1	Battery; supply for real-time clock
J15	I/O's for external device input/output
J19 GND	Ground connector for connection with antenna frame/base

Table 1: The RF Mono PCB components

5.6.2 I/O connections

The RF Mono board is equipped with two I/O's, which can be used for connecting a pushbutton (Forced Alarm option) or as output for other external devices (e.g. camera).

To avoid interference, caused by the wires which will be connected to any of the I/O's, it is very important to only connect the wires to the I/O connector contacts.

Do not connect any of the wires directly to a GND contact on the RF Mono board or on the power supply! Use the I/O's "GND" connector to connect to the ground.

The I/O's have a current limit of 70mA. Do not connect devices to the I/Os that draw more than 70mA, else the I/O drivers will get damaged!

Figure 7 shows the proper way to connect a "Forced Alarm" pushbutton between "I/O1" and GND".

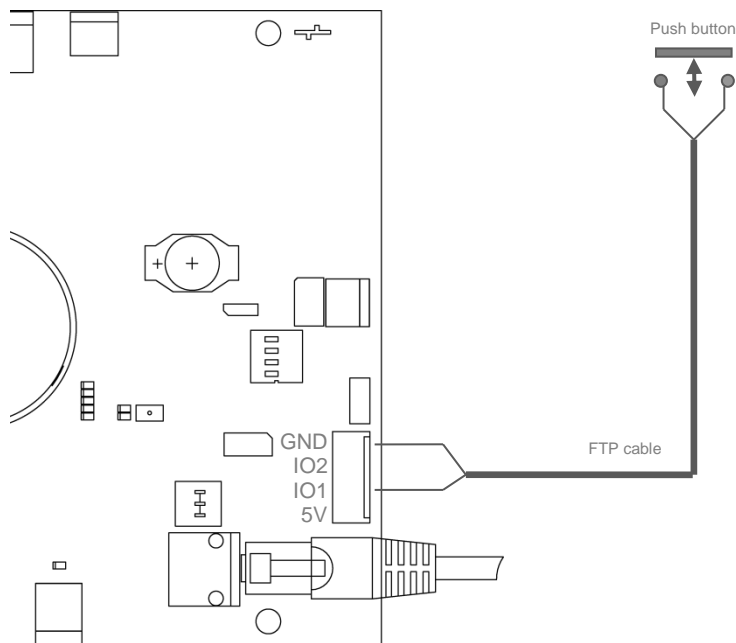


Figure 7: Proper I/O connections for the RX

6 Configuration

This chapter describes the recommended adjustment procedure for the RF Mono transceiver.

6.1 General connections

- Refer to chapter 3 for noise sources and installation guidelines.
- Position the antenna(s) at the required location.
- Connect the power supply to the power input of the RF Mono board. See section 5.5 for power supply information and restrictions.
- Connect UTP cables between all RF Mono boards in case of a multiple antenna setup
- Switch on the power supply → the power LED on the RF Mono PCB should light up.
- Wait for about 15 seconds for the system to start up completely.

6.2 Synchronization

When multiple RF Mono antennas are installed in the same shop, like in supermarket checkouts or multiple entrance shops, one of the RF Mono antennas will be declared as master and all other antennas, which are connected to the same field bus, will be slaves. Also each antenna must be set to the correct timeslot value. The next sections will explain these settings in more detail.

6.2.1 Master-slave configuration

Each RF Mono antenna is factory default delivered as Master antenna, which means they will function out of the box when power is supplied to it. However, in a multiple antenna setup, only one master is allowed on the field bus, thus making it necessary to declare one antenna as Master and all other antennas as Slaves.

The Master selection must be done using Device Explorer after all antennas have been connected and are receiving power supply.



If more than one master is active, the antennas will suffer from increased noise levels, resulting in spontaneous alarms and decreased sensitivity. Make sure only one Master is declared and all other antennas are set to Slave.

The RF Mono antennas do not require any extra synchronization cables. All connected antennas will receive all required signals through the UTP cables from the master antenna.



If more than two (2) RFM antennas are installed, it is strongly recommended to make the RFM antenna in the middle (or one closest to the middle) the RFM master antenna. This will prevent long signal delay between the RFM master antenna and the last RFM slave antenna.

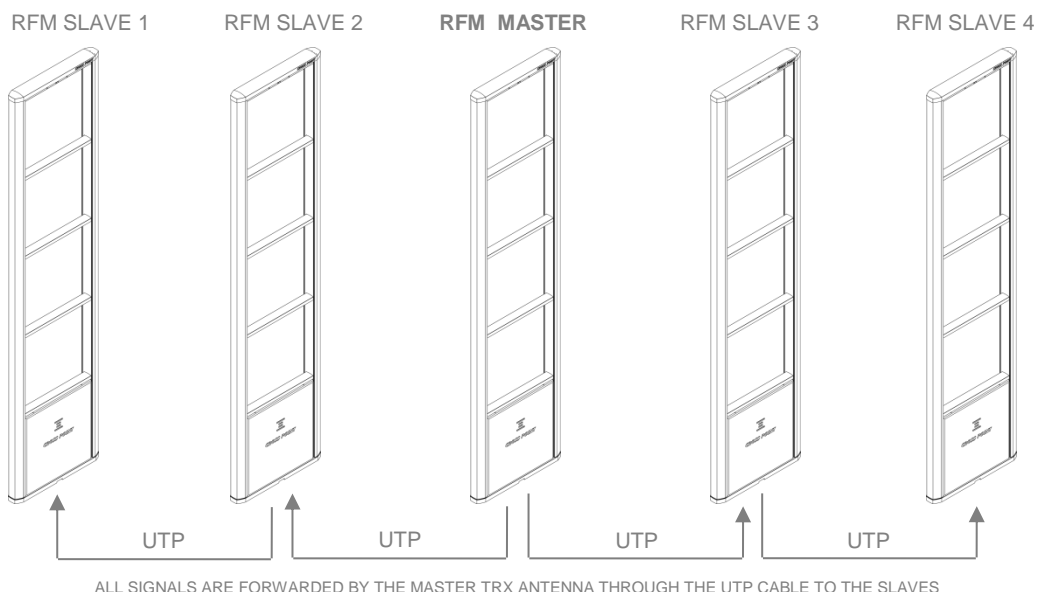


Figure 8: Synchronization through UTP cable, center antenna is master

6.2.2 Timeslot configuration

When multiple RFM antennas are installed in one row or close to each other, each antenna must be configured with the correct timeslot setting, to avoid alarms being triggered on other antennas when a tag is moving close to one of the antennas.

The selectable timeslots are 1 and 2 and must be set in an alternating pattern. When the first antenna is set to timeslot 1, the second antenna must be set to timeslot 2, the third antenna to timeslot 1, the fourth antenna to timeslot 2, the fifth antenna to timeslot 1 and so on. The next image shows the correct timeslot setting for a multiple antenna setup.

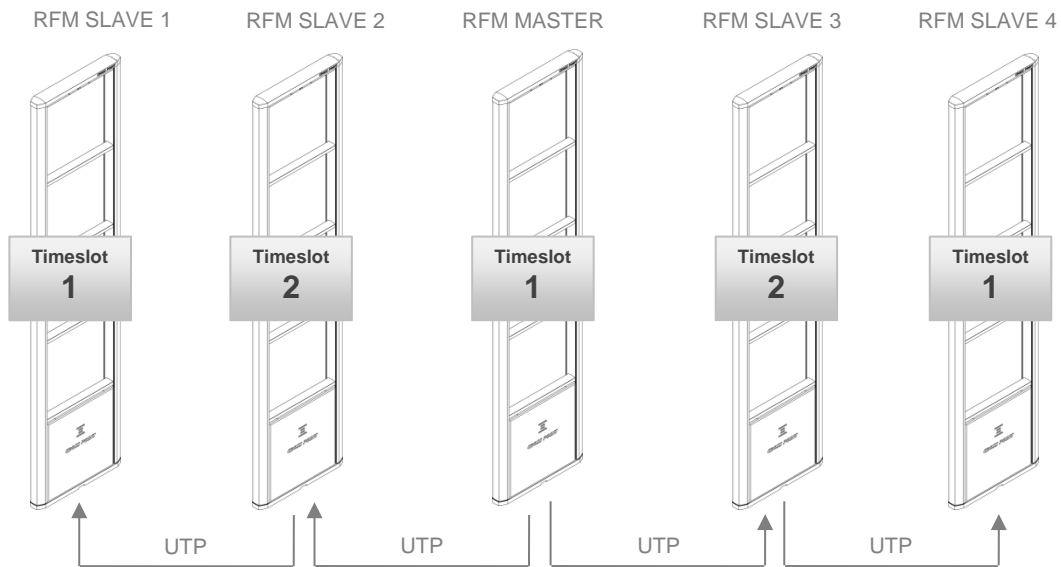


Figure 9: Correct alternating timeslot setting for a multiple antenna setup

6.3 RF Mono configuration

Although the RF Mono antennas come pre-configured with factory settings, it can be necessary to fine-tune these antennas for best performance in your specific environment.

The RF Mono antennas must be configured using a CrossCONNECT Access Point and a laptop computer with Cross Point Device Explorer software installed.

The next chapter will cover all configuration possibilities using Cross Point Device Explorer.

7 Cross Point Device Explorer

This chapter covers the RF Mono antenna settings in combination with the Cross Point Device Explorer software.

Please refer to chapter 2.2 for details on the Field Bus structure.

For the Cross Point Device Explorer installation procedure and other general settings we refer to the **Cross Point Device Explorer User Manual** (download available at www.crosspoint.nl).



Make sure to keep your laptop at least 3m away from the antennas. The back light of the laptop screen can create a lot of noise and might reduce the performance of the system!

7.1 Starting Device Explorer

After having installed the Cross Point Device Explorer, go to

Start > All programs > Cross Point > Device Explorer

(or your, during installation specified, destination folder) to start the Device Explorer.

7.2 Logon to Device Explorer

After starting the Device Explorer, you will be prompted to enter your username and password that allow you to use the Device Explorer.

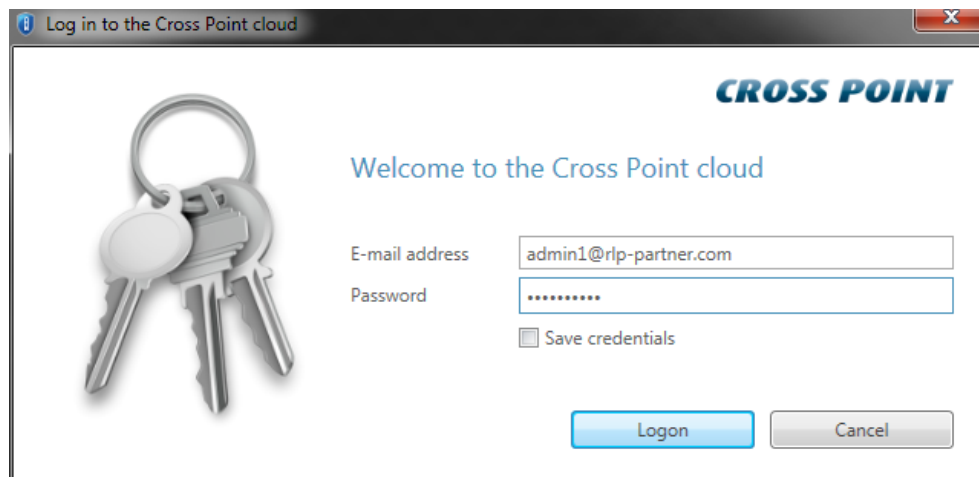


Figure 10: Logon to Device Explorer

These credentials have been supplied to you by Cross Point or a partner of Cross Point.

Tick the “Save credentials” checkbox if you want to use the specified logon credentials each time you start the Device Explorer.

Enter your credentials and click the Logon button to continue.

7.3 Store overview

When Device Explorer is started and you have successfully logged-on, the Store overview screen opens.

All Access Points that are available for you are shown in this screen.

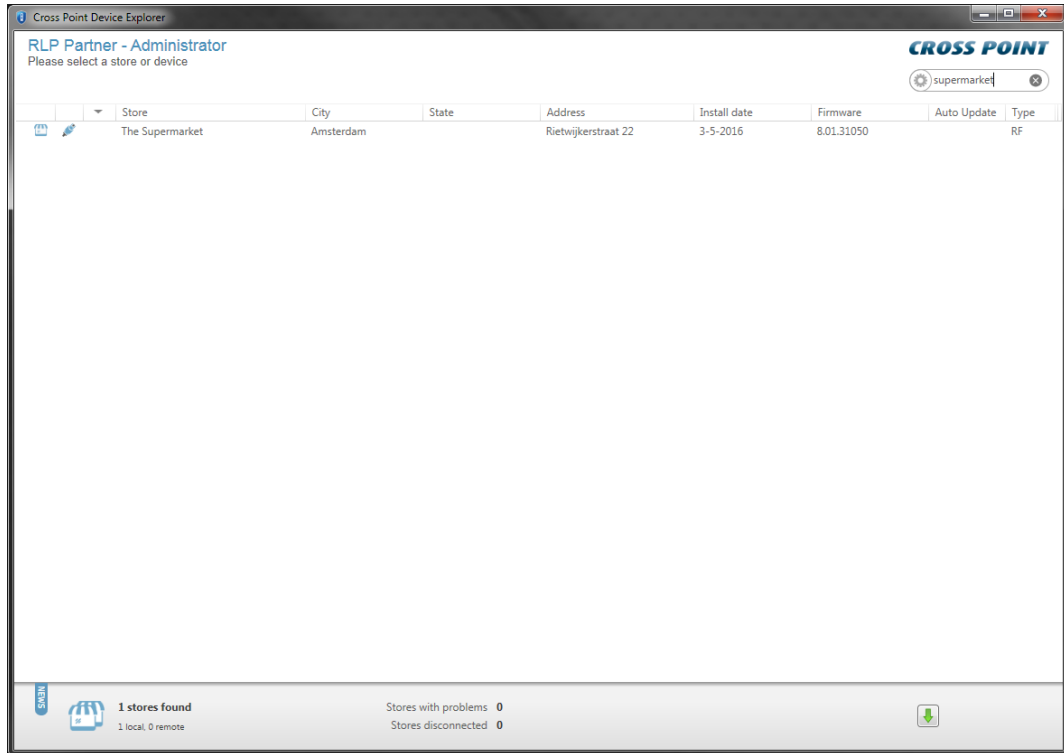


Figure 11: The Main screen

Select the required store from the Store overview screen through a double click on the store to be able to perform local or remote service to the RF Mono systems that are installed in the selected store.

The next chapters will cover the specific RF Mono properties and settings.

Please refer to the Cross Point Device Explorer User Manual for more information on how to change settings for the Access Point itself.

7.4 Dashboard

After a successful logon to the selected Access Point, the Dashboard for this Access Point appears.

In case there are no devices connected yet to the Access Point, the Dashboard will show the “No devices found” message.

If there are any devices connected to the Access Point, but no entrances have been created yet, the message “No entrances found” will appear.

In case devices are connected and entrances have been created, the Dashboard will display details similar to those in Figure 12.

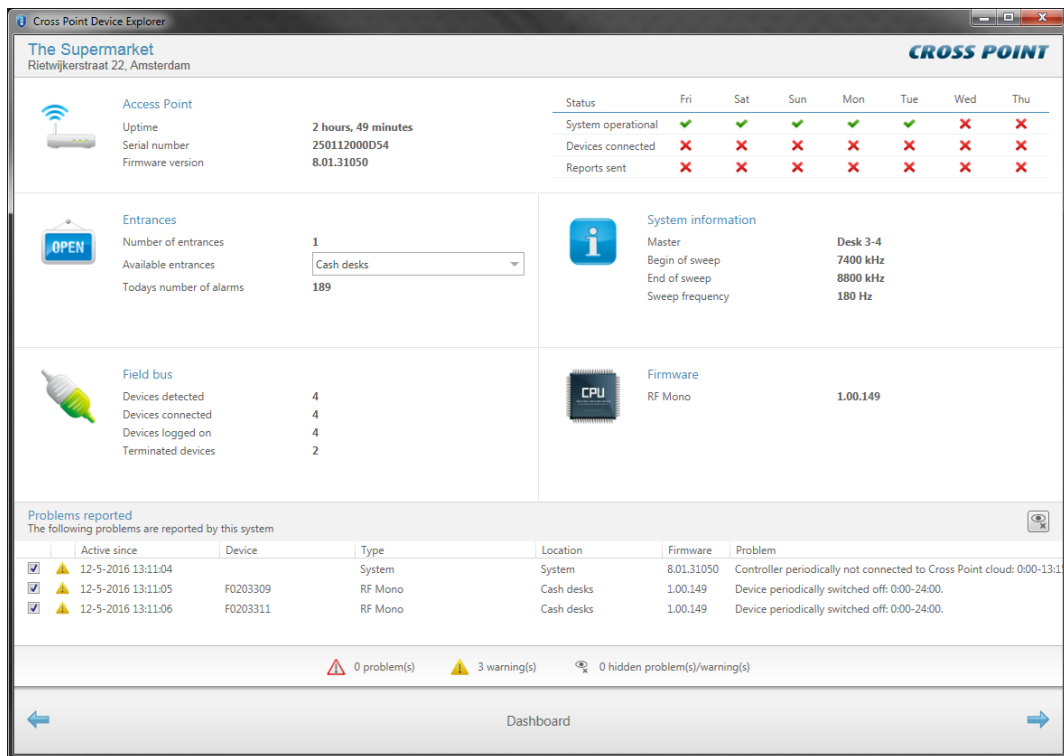


Figure 12: The Dashboard

7.5 Logon to the connected devices

The RF Mono devices are secured against unauthorized access by means of a special code, the Installer Access code.

The Access Point logs-on to the devices using the Installer Access code.



The Installer Access code is automatically derived from your company’s dealer code and cannot be customized! You can view your new Installer Access Code in the Device Explorer.

The Field bus section shows if the logon to all detected devices was successful.

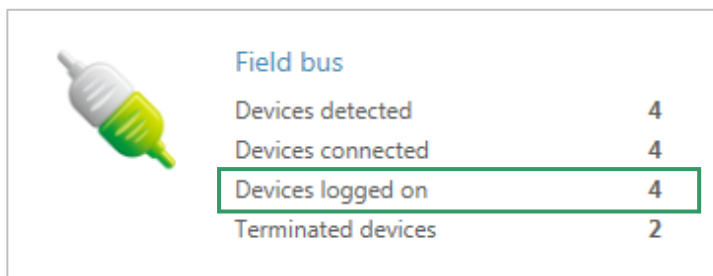


Figure 13: Dashboard – Fieldbus section - Logon status

7.6 Creating entrances

If entrances have not yet been created and the Device Explorer shows the screen as displayed in **Error! Reference source not found.**, you can just click the Yes button to start the automatic antenna arrangement on the Access Point.

Once the antenna arrangement procedure has finished, the Entrances section in the Dashboard will show the number of entrances that were created, each individually selectable entrance and the number of visitors (Optima models only!) and alarms for the selected entrance.

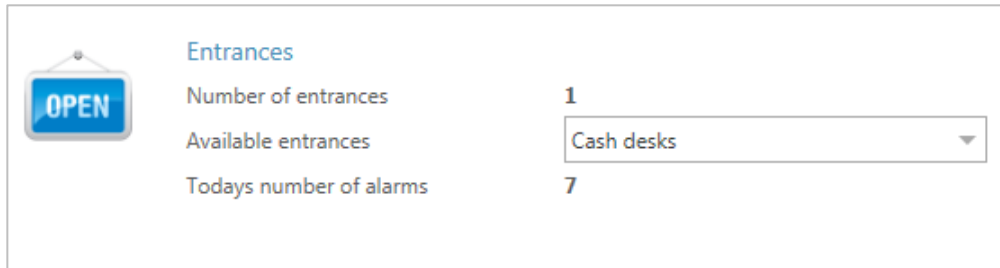


Figure 14: Dashboard – Entrances section

RF Mono Optima systems can be arranged automatically using the visitor counters of each antenna. RF Mono Luna and Nuda systems, not having an integrated visitor counter, will be arranged in a “Best guess” entrance. This best guess situation may not represent the actual system’s layout, in which case you will have to manually adjust the position of these antennas.

Click on the Entrances section of the Dashboard to go to the Entrances page to start configuring the created entrance(s).

7.7 Configuring entrances

When the Entrances section is clicked in the Dashboard, the Entrances page is shown.

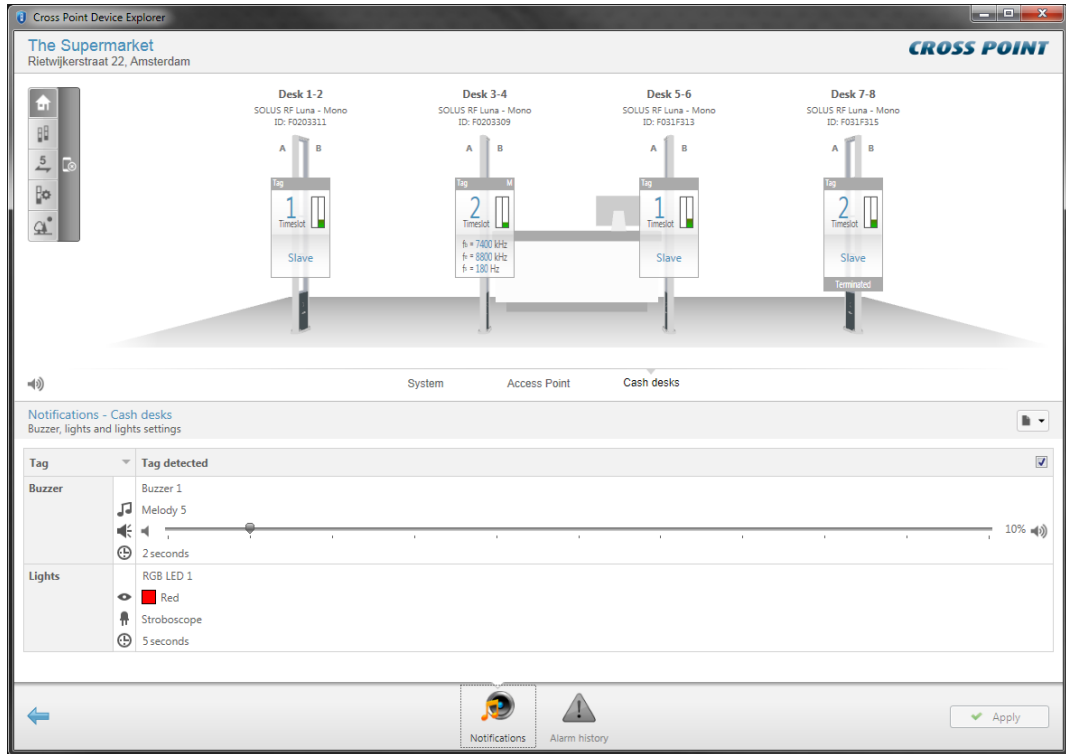


Figure 15: Entrances

The Entrances page is divided in 2 parts:

7.7.1 Entrances - Top part

The top part of the Entrances page consists of the following section:

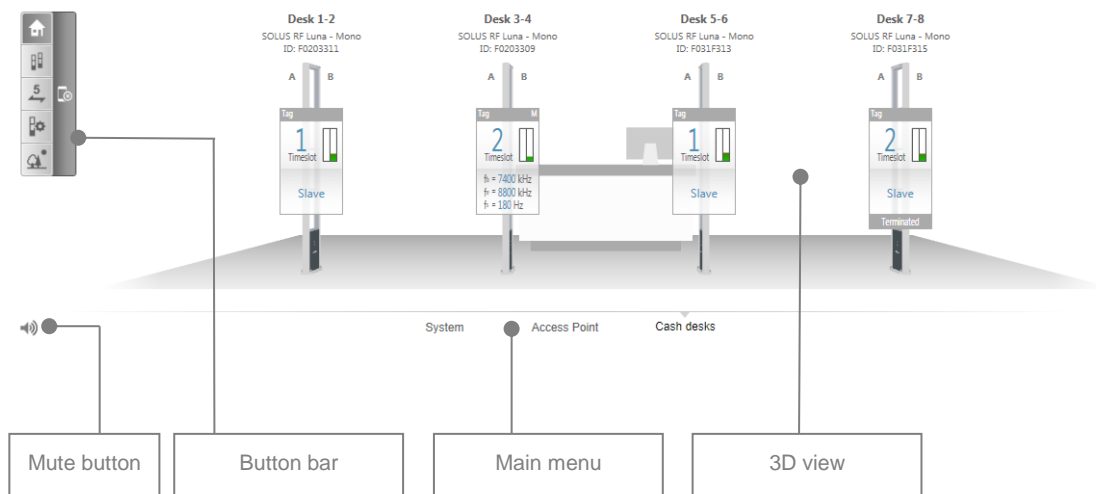



Figure 16: Entrances – Top part

The **Mute** button  enables you to switch off all buzzers on all devices at once. This is useful when you are configuring the system and don't want any loud alarms.

7.7.2 Main menu

The Main menu lets you quickly navigate to the other available sections of the Device Explorer:

- **System** – refer to paragraph 7.8 for further details
- **Access Point** – refer to the Cross Point Device Explorer manual for further details

7.7.3 3D antenna view

The 3D view shows the RF antennas that have been either automatically arranged or manually inserted in the selected entrance.

When entering the Entrance page, this Normal view is activated by default.

Various options for the selected entrance are available through the Entrance button bar.

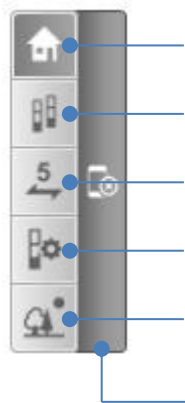


Figure 17: Entrance button bar

Dependent of the selected button, the buttons at the bottom of the Button bar will vary.

7.7.3.1 Normal view

Click the **Normal view** button to return to the normal 3D front view.

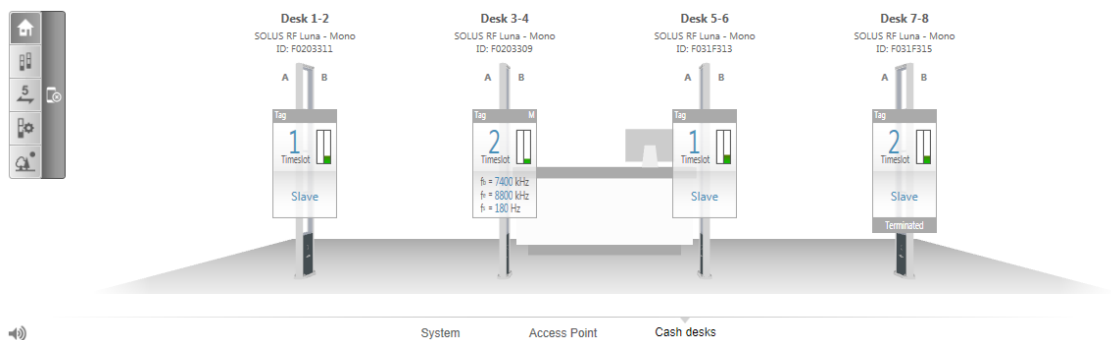


Figure 18: Normal view

7.7.3.2 Perspective view

Click the **Perspective view** button to change the 3D view into a perspective view, to be able to quickly navigate to a specific aisle or antenna, especially useful for large installations.

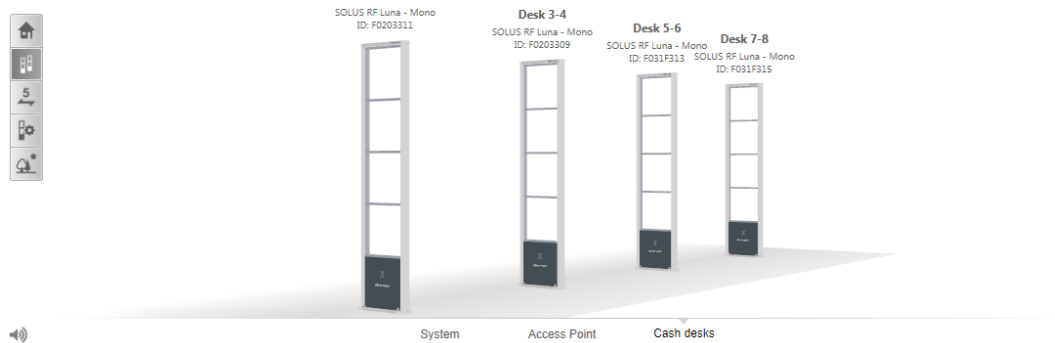


Figure 19: Perspective view

The Show/hide panels button is not available in this view.

7.7.3.3 Counting view

Click the **Counting view** button to change the 3D view to helicopter view and see the number of visitors (Optima model only) or alarms per aisle.

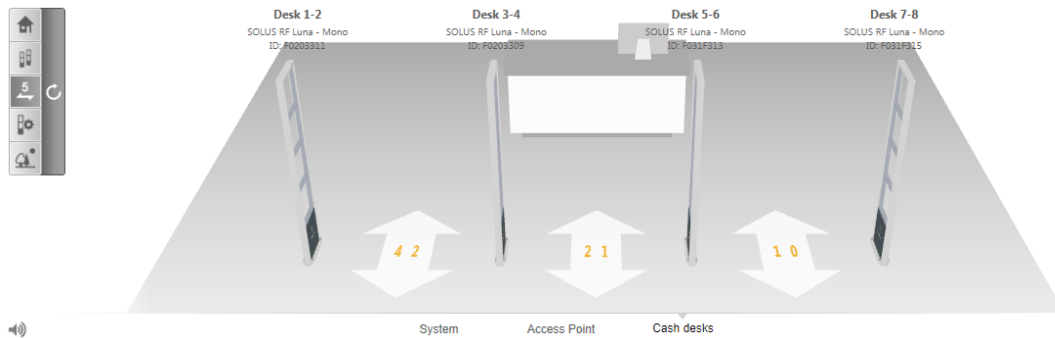



Figure 20: Counting view - Alarms

The visitors counting view is only available when FORTUS RFM Optima systems are being used.

The green number indicates the number of visitors that have entered the store through that aisle. The red number indicates the number of visitors that have left the store through that aisle.

Click the **Show alarm counting** button  in the button bar to view the number of alarms that have been detected for each aisle.

Click the **Reset counting** button  to clear all counting totals for the selected type (visitors or alarms) for this entrance.

7.7.3.4 Entrance arrange view

Click the **Entrance arrange view** button if you want to make any changes to the antenna arrangement or other entrance and antenna related properties.

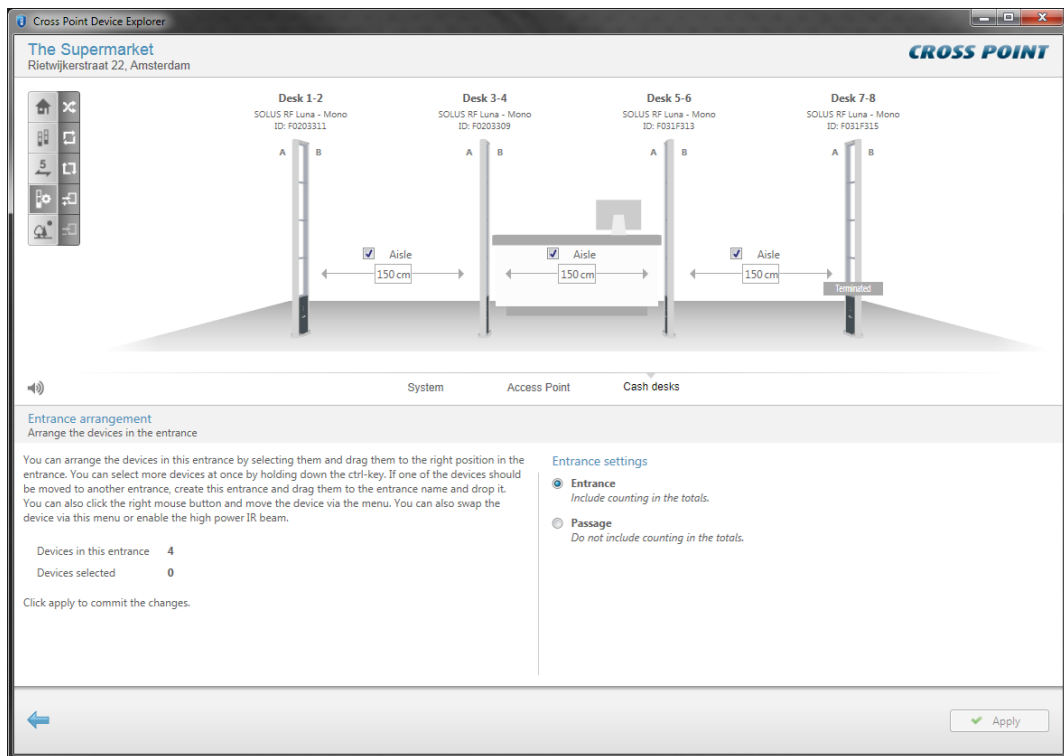



Figure 21: Entrance arrangement mode

In the Main menu, an extra entrance named “Unarranged” appears. If any antennas could not be automatically arranged or extra antennas are added after automatic antenna arrangement was performed, these antennas are automatically added to the Unarranged entrance.

You can now either start the automatic antenna arrangement by clicking the **Automatically arrange all devices** button  in the button bar or drag & drop antennas manually from the Unarranged entrance into the appropriate entrance.

Antennas can be picked up by clicking on the antenna image and moving the antenna while keeping your left mouse button pressed. Move the antenna over the name of the destination entrance and you will see the plus-sign  appear. To place the antenna in that entrance, just release the left mouse button.

In the same way, antennas can also be swapped to another position within the same entrance. Visitor counters will be enabled or disabled automatically dependent of the position of the moved antenna in relation to the other antennas.

To select and move multiple antennas at once, keep the **Ctrl** key on your keyboard pressed while selecting the required antennas. After selecting all antennas, release the Ctrl key and drag & drop the antennas in the desired entrance.

The Entrance button bar has changed and shows the following antenna arrangement related buttons:

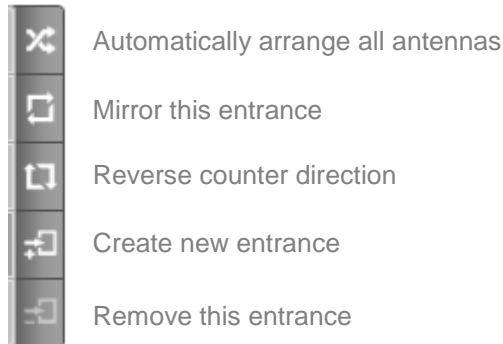


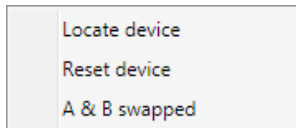
Figure 22: Entrance arrange view related buttons

The names of the antennas, aisles and entrances can be changed by clicking on the name and entering the new name. Just click somewhere outside of the text input field to apply the new value.

The aisle width for each aisle can be specified. By default the value is set to 160cm, but can be changed to the actual value by clicking on the aisle width and entering the correct value. In case all aisles in this entrance have the same aisle width, just enter the value for one aisle and then click the pair button to change all aisles to the same aisle width.

7.7.3.4.1 Context menu

Clicking on the antenna image with the right mouse button will reveal the context menu for the selected antenna.



The context menu offers specific functionality.

RFM context menu

- Locate device – when selected, the buzzer and/or LEDs will be activated. Useful for determining the actual location of the selected antenna.
- A & B swapped – turns the antenna around, swapping the A- and B-sides.
- High power – enables/disables the visitor counter’s high power setting (Optima model only)
- Reset device – will perform a soft reset of the selected device (no settings or data will be lost)

7.7.3.5 Reverse view direction

By default the 3D-view shows the entrance from the outside looking into the store. This view can be reversed (looking outside from within the store) by clicking the Reverse view button. This does not change the actual counting direction!

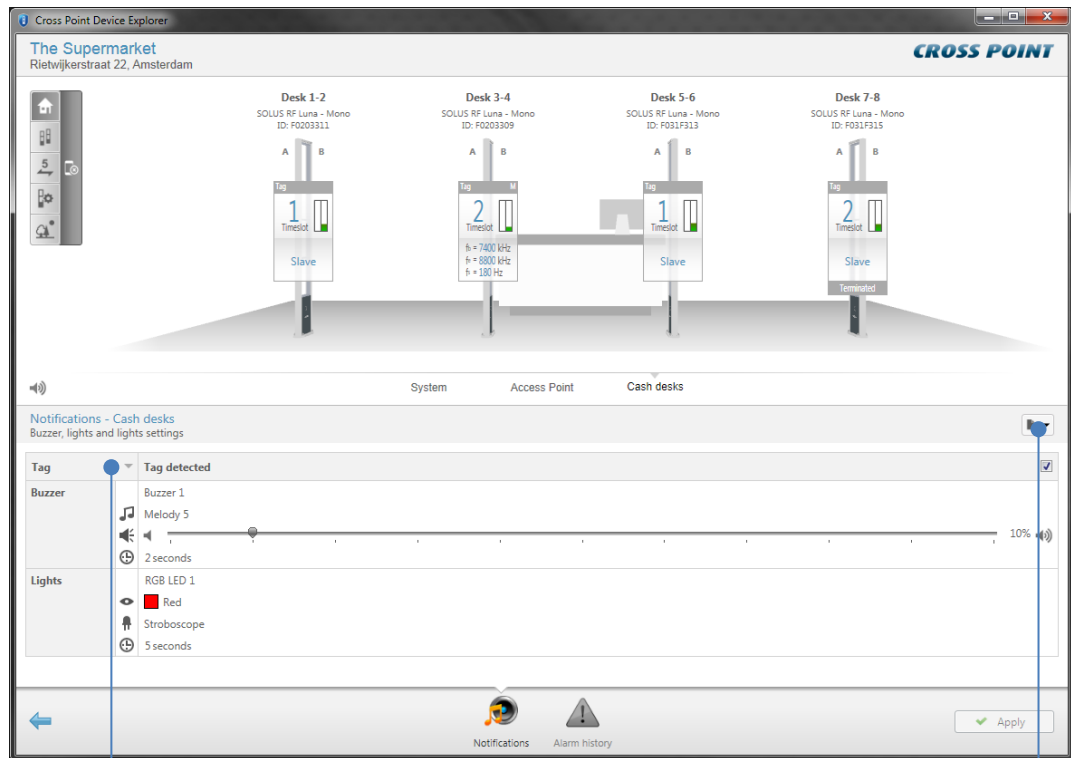
7.7.4 Entrances – selected entrance

When an entrance is selected in the Main menu and the Home button in the button bar is pressed, the bottom part of the screen will show the following tabs:

7.7.4.1 Notifications

In case of an alarm situation, notifications will be used to draw attention and to present information about the type of alarm.

Notifications can be set for each entrance individually, when different notifications per entrance are required, or you can set the notifications for all entrances at once. To do this, go to **System** and specify the required notification settings. See section 7.8 for more details.



Select notification type here

Pre-defined notifications

Figure 23: Entrance notification settings



Entrance notification settings apply to all antennas that are part of the selected entrance. It is not possible to create different individual notification settings within the same entrance!

The following notification types can be selected by clicking on the cell in the top left corner of the notifications table:

- Tag
- Visitors (Optima models only)
- Other

7.7.4.1.1 Tag

The following tag alarm notification is available for the RFM system:

Notification	Explanation
Tag detected	This notification can be used as a 'pre-alarm' feature when the option "Use visitor counter to distinguish in- and outgoing alarms" has been enabled.

Table 2: Alarm notification

For RFM Optima models the Incoming, Outgoing and Undefined tag alarm notifications are also **not** available.

7.7.4.1.2 Visitors

Available for Optima models only.

Notification	Explanation
Incoming visitor	When a visitor enters the store, a 'doorbell' notification can be triggered to notify employees in the store that a visitor has just entered the store.
Outgoing visitor	When a visitor leaves the store, a 'doorbell' notification can be triggered to notify employees in the store that a visitor just left the store.
Visitor counter blocked	When the infra-red beam of the visitor counter is blocked for a specific minimum amount of time (default 30 seconds), a counter blocked notification can be triggered to notify visitors and employees in the store that there is an aisle blockage. NOTE: The wait time before visitor counter blocked can be adjusted to another value if required. Just specify a value between 1 and 3600 seconds.

Table 3: Visitors notifications

7.7.4.1.3 **Other notifications**

Notification	Explanation
Default notification	Enable this notification if you want to visualize that the antenna is switched on. For example the green LED can be switched on infinite to show the visitor that the system is active.
System jammed	Set this notification to notify store employees in case the system is being jammed with a jamming device or as a result of another high noise source.

Table 4: Other notifications

7.7.4.1.4 **Saving notification settings**

Notification settings can be saved for usage in other entrances or stores. Click the **Load and save notifications** button and select the option 'Save notifications' from the menu and the Save notifications dialog opens.

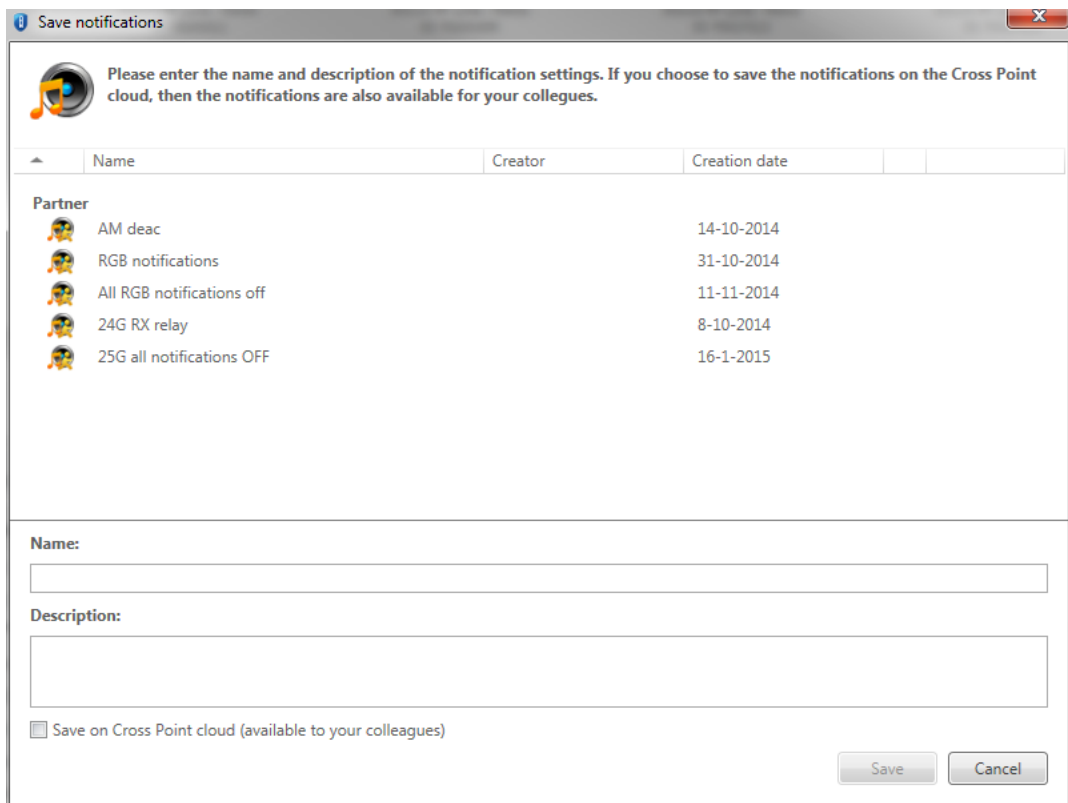


Figure 24: Save notifications

A list with pre-defined notifications that have previously been saved appears. Select one from the list to overwrite the selected pre-defined notification, or enter a new name and description for the new notification.

If you have an active internet connection, you can also tick the checkbox in front of the option 'Save on server' to store this new pre-defined notification centrally, so it is also available for your colleagues.

Click the Save button to store the notification.

Select a notification and click the **Delete** button  to delete a pre-defined notification.

7.7.4.1.5 Loading pre-defined notifications

Pre-defined notification settings can be loaded again by clicking the **Load and save notifications** button, selecting the option 'Load notifications' from the menu and the Load notifications dialog opens.

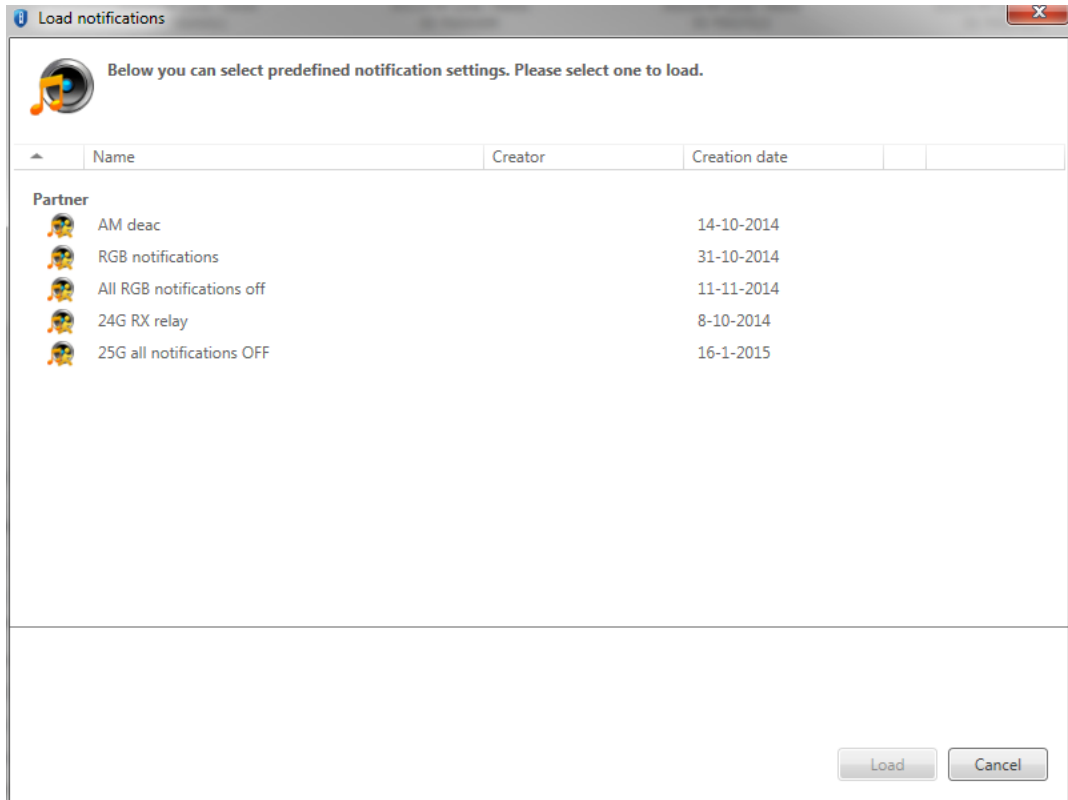



Figure 25: Load notifications

A list with pre-defined notifications that have previously been saved appears. Select the required notification and click the **Load** button to load the pre-defined notification settings.

Hover your mouse cursor over a notification and click the **Delete** button  to delete a pre-defined notification.

7.7.4.1.6 Alarm history

The Alarm history screen shows a list of tags that have been detected on all antennas in this entrance.

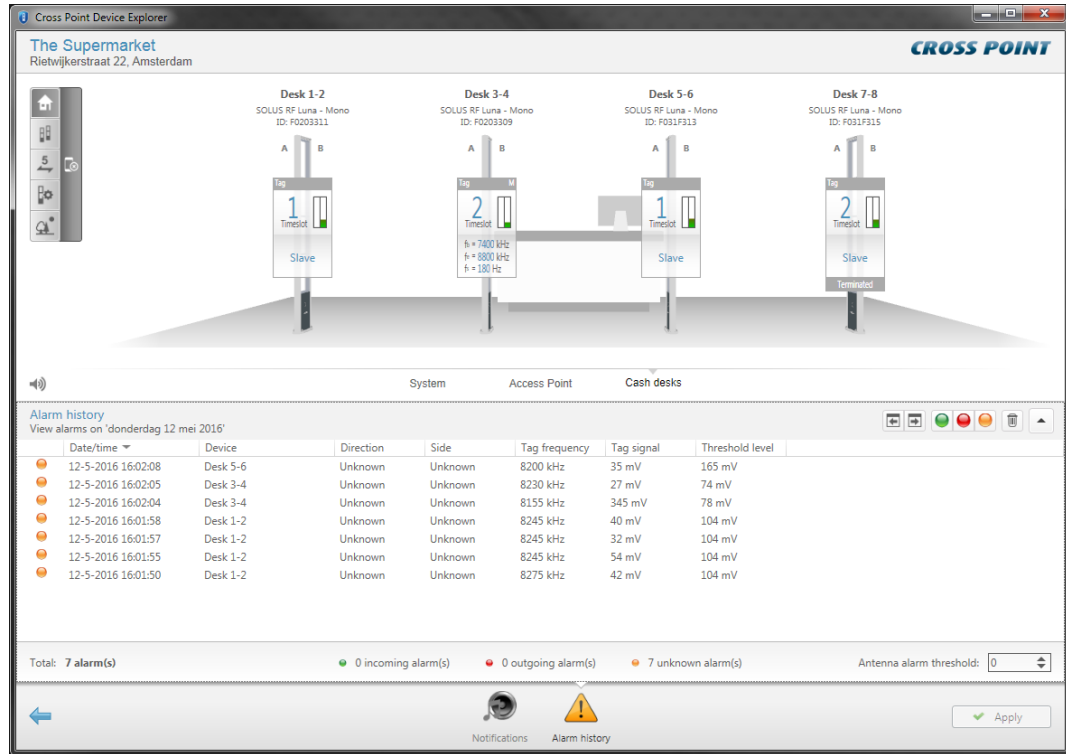








Figure 26: Alarm history

Dependent of the notification settings, the incoming , outgoing  and undefined  alarms can be distinguished by means of their individually colored icons.

By default all types of alarms are displayed, but pressing one or more of the filter buttons will show or hide the selected alarms.

All alarms are date & time stamped, so it's easy to find out when they occurred.

It is possible to view the alarm history per day for the last 30 days or to a maximum of 390 alarms per device. Just click the Previous/Next day buttons   to scroll through the alarm history.

Click the Delete button  to delete all alarms in the list and to permanently remove them from all the connected antennas in this entrance.

7.7.4.1.7 Antenna alarm threshold

The antenna alarm threshold value indicates the number of alarms that are accepted by the retailer to occur each day. If the number of alarms for this entrance exceeds the configured value, a problem will be generated and will be visible in the 'Problems reported' section of the dashboard.

The value '0' disables this feature and will never raise a problem. Any other value will, when exceeded, raise a problem.

7.7.5 Entrances – selected antenna

If you click on an RFM antenna in the 3D-view, various individual antenna settings can be configured. The following tabs will appear at the bottom of the screen:

7.7.5.1 Scope view RF

The Scope view RF screen offers oscilloscope views of the signals received by the RFM antenna.

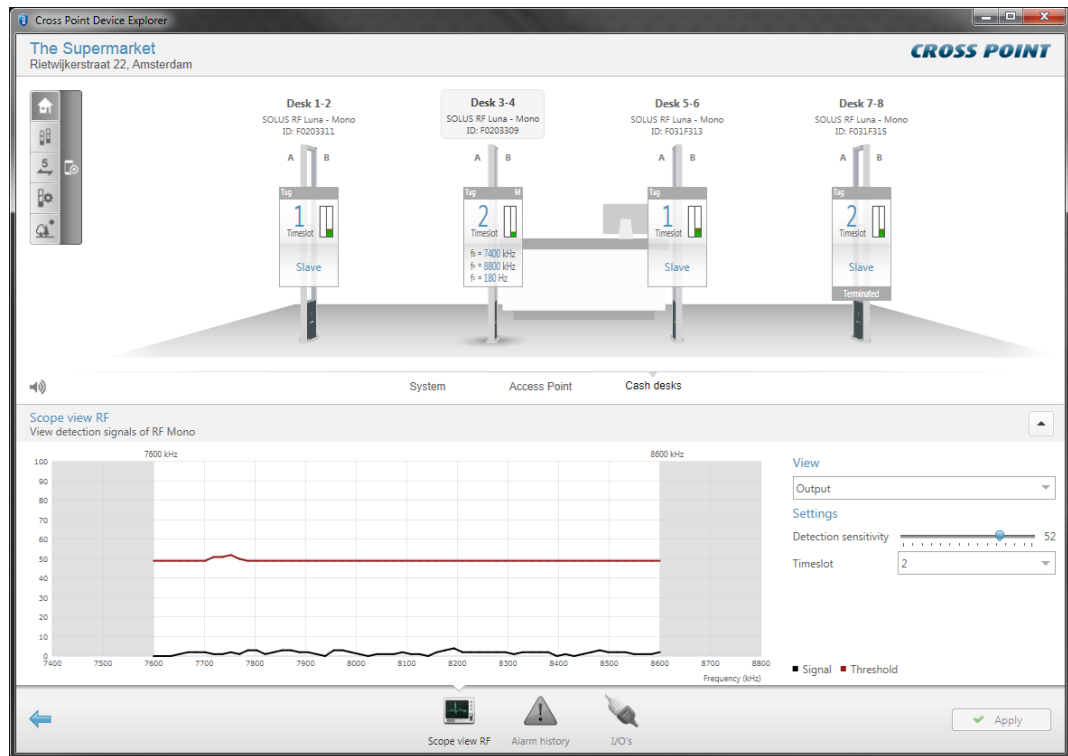


Figure 27: Scope view RF

This scope view shows the detected signals (black line) as they appear within the transmission bandwidth (white section). The total bandwidth depends on the “Begin of sweep” and “End of sweep” settings in the **System – RF settings** screen (see section 7.8.2).

7.7.5.1.1 Views

By default, the Output scope view is displayed, but also other scope views can be selected under View. The following scope views are available.

- Output (default selected)
- Input X
- Input Y
- Tuning

The X-axis shows the frequency in kHz and the Y-axis shows the signal amplitude.

7.7.5.1.2 View output

The Output scope view shows the detected signals after full digital processing and filtering. When a tag is presented within the detection range, the signal created by the tag

will become visible. When this signal rises above the red line in the middle of the scope view (the threshold level), an alarm will be triggered.

The threshold level is always situated around the value 50 and adapts itself to the highest noise levels. When the Detection sensitivity is set to a lower value or in case of low environmental noise, the threshold line will be a flat line.

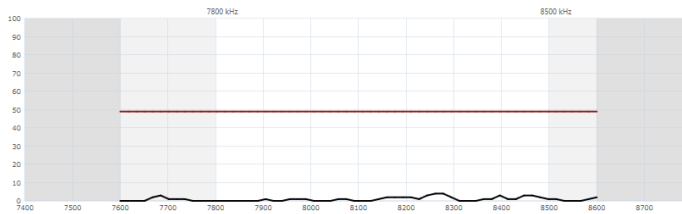


Figure 28: Flat threshold line

When the Detection sensitivity is increased or when environmental noise is higher, the threshold level will be raised for those frequencies where a stronger noise signal is detected.

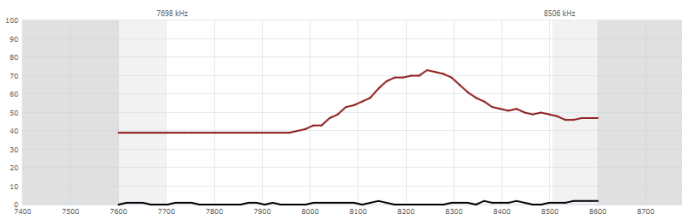


Figure 29: Partially raised threshold curve

Maximum detection sensitivity is reached when 50% of the threshold curve is flat and the other 50% is raised. Adjusting the Detection sensitivity any further will not make the system more sensitive for tags.

7.7.5.1.3 View Input X and Input Y

The scope views Input X and Input Y show the detected signals before they are fully processed and filtered (raw data). These scope views are useful for determining the type and amount of interference. In case of environmental noise, these views will show you the effect of switching potential noise sources on and off.

The images below show a low noise environment versus a high noise environment.

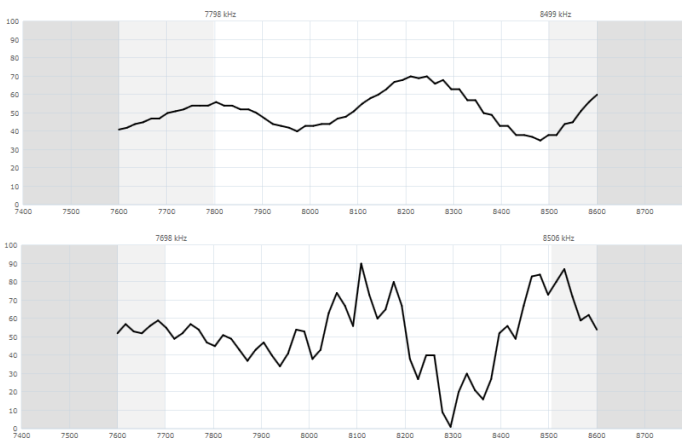


Figure 30: Low noise versus high noise environment, viewed in Input X view

7.7.5.1.4 View tuning

The Tuning scope view shows the tuning of the antenna. Each RFM antenna is factory pre-tuned and should resemble an image as displayed below.

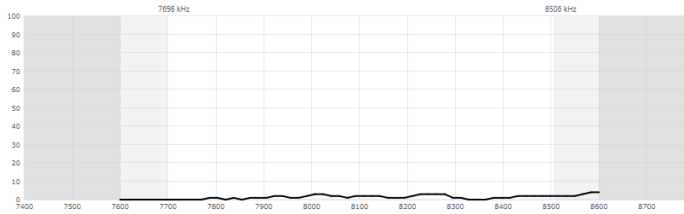


Figure 31: The tuning scope view

A properly tuned RFM antenna shows a more or less flat signal over the complete bandwidth. Any visible peaks should preferably not be higher than the value 10.

In situations where the RFM antenna is installed close to (large) metal objects, like cash desks, or if a metal shielding is placed behind the antenna, re-tuning of the antenna might be necessary. Tuning of the antenna is done with the two variable capacitors C3 and C8, which interact with each other. The object is to obtain an as flat as possible signal line over the full bandwidth.

Do not change the tuning if you're not sure what you're doing, because a wrongly tuned antenna will have reduced performance!

7.7.5.1.5 Reducing the detection bandwidth

In case of (high) noise in the lower frequencies, for example <7.7MHz, or in the higher frequencies, for example >8.5MHz, the detection bandwidth of the receiver can be reduced to eliminate the effect of this noise and to block detection for that area.

To reduce the bandwidth, just move your mouse cursor close to the left or right edge of the detection band until you see the cursor change into a left-right arrow. Then click and drag to move the edge of the detection band to the desired frequency.

The blocked area(s) are marked with a transparent light grey mask, under which the signal line is still visible. In the blocked area(s) there will be no detection of any signals (noise and tags)!

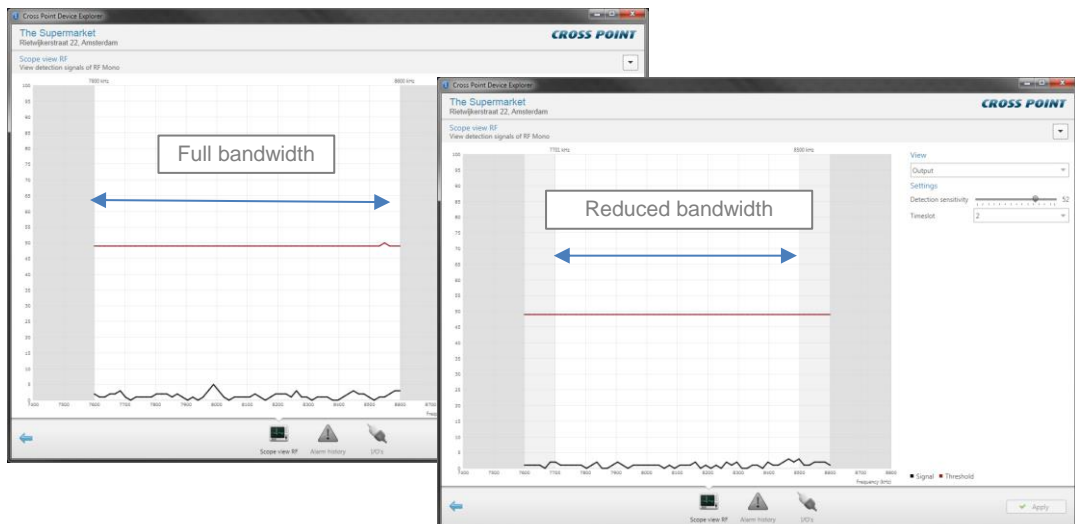


Figure 32: Reduced bandwidth example

7.7.5.1.6 Settings – Detection sensitivity

The detection sensitivity setting lets you adjust the overall sensitivity of the RFM antenna between the values 0 (lowest sensitivity) and 69 (highest sensitivity). When adjusting the detection sensitivity, the threshold curve should be watched carefully. As long as the threshold curve is a completely flat line, there is still room for increasing the sensitivity.

Maximum detection sensitivity is reached when 50% of the threshold curve is flat and the other 50% is raised. Adjusting the Detection sensitivity any further will not make the system more sensitive for tags.



Never adjust the antenna too sensitive, as this will result in false alarms! Remove the noise sources that interfere with the system or move the antennas as far as possible away from noise sources.

7.7.5.1.7 Settings – Timeslot

The RFM antennas are based on pulse-listening technology, which means a transmission burst is followed by a reception window in which a potential tag signal can be detected. The RFM system is divided into two timeslots, to avoid that the alarm will be triggered on antennas installed next or close to each other when a tag is moving close to one of these antennas.

In case only one RFM antenna is installed without any other RFM antennas within 3.5 meters distance, it doesn't matter which timeslot is used. See section 6.2.2 for more details on how to configure the timeslot settings in a multiple antenna setup.

To convince yourself that all antennas are set to the correct timeslot, you can use the "Locate device" feature on each antenna and visually check if the correct antenna lights up.

7.7.5.1.9 Alarm history

The Alarm history screen shows the tags that have been detected on the selected antenna.

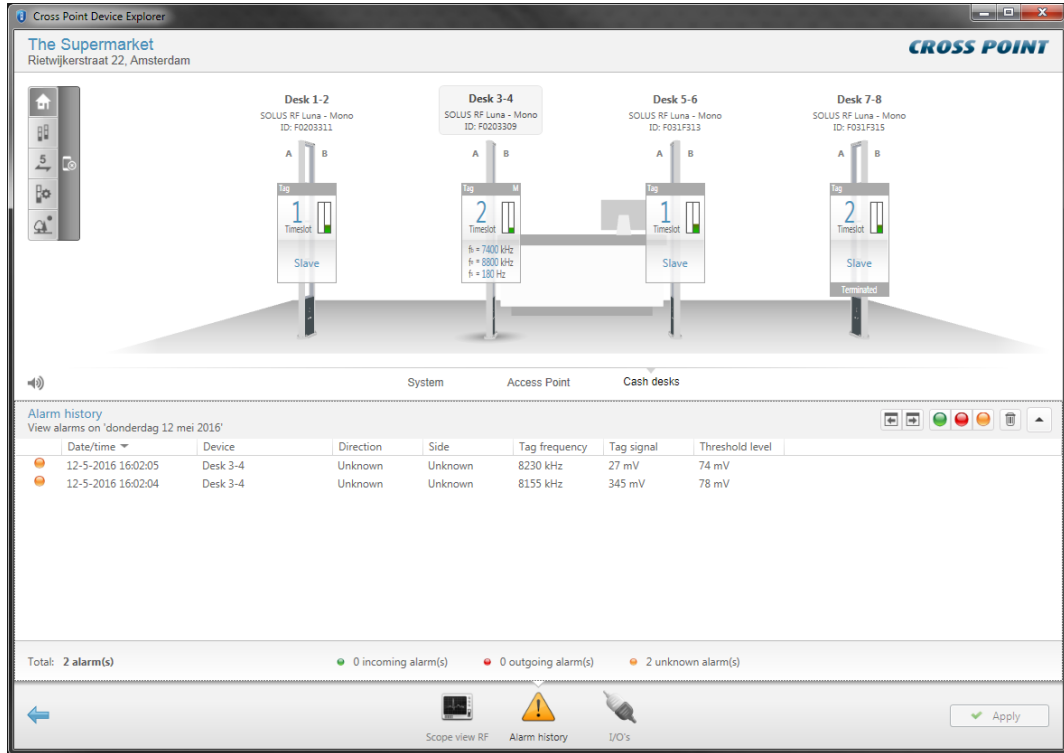








Figure 33: Alarm history

Dependent of the notification settings, the incoming , outgoing  and undefined  alarms can be distinguished by means of their individually colored icons.

By default all types of alarms are displayed, but pressing one or more of the filter buttons will show or hide the selected alarms.

All alarms are date & time stamped, so it's easy to find out when they occurred.

It is possible to view the alarm history per day for the last 30 days or to a maximum of 390 alarms per device. Just click the Previous/Next day buttons   to scroll through the alarm history.

Click the Delete button  to delete all alarms in the list and to permanently remove them from the selected antenna in this entrance.

7.7.5.2 Notifications – I/O settings

Next to the audio and visual alarm notifications, as described in section 7.7.4.1, also a relay and a maximum of 2 I/O's can be configured to activate any external device (camera, external buzzer, etc.) during an alarm situation.

These notification settings have to be configured on each individual antenna, since the relay and I/O's are antenna specific. Any externally connected device needs to be physically connected to the antenna.

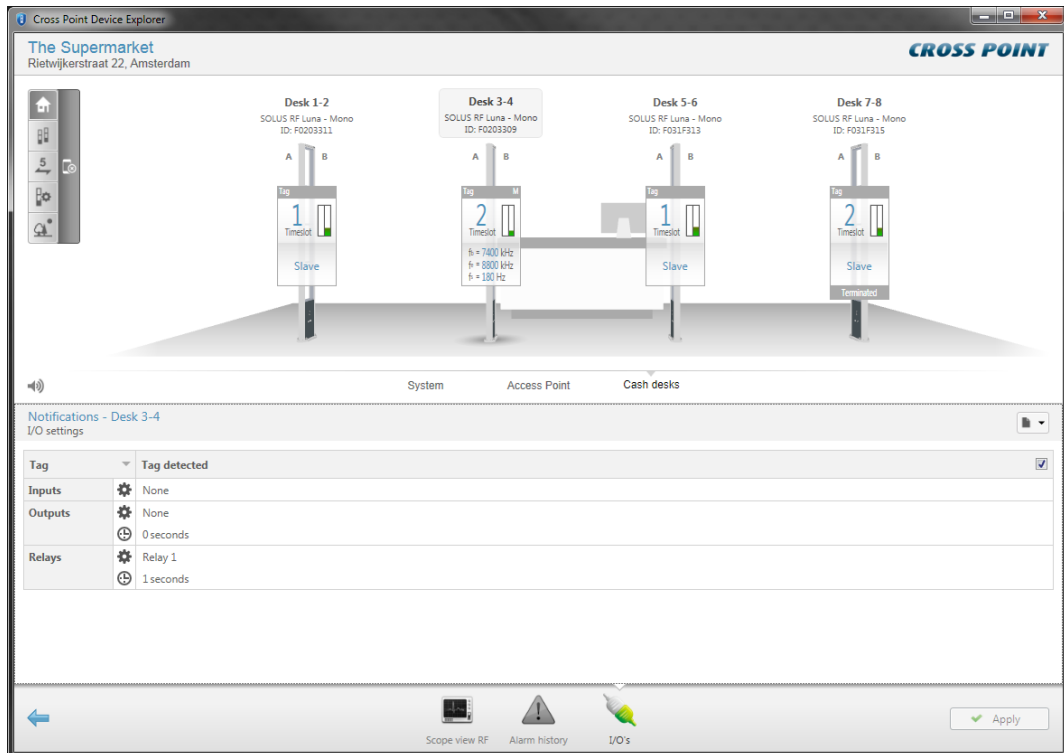


Figure 34: Notifications – I/O settings



Relay and I/O notification settings apply only to an individual antenna!

The following notification types can be selected by clicking on the cell in the top left corner of the notifications table:

- Alarms
- Visitor counters (Optima models only)
- Other

Refer to section 7.7.4.1 to view all available notification types.

7.8 System

Clicking the System hyperlink in the Main menu or clicking the System information section in the dashboard will open the System information screen. Through the System screen, various system-wide settings can be configured and applied to all devices on the Field Bus.

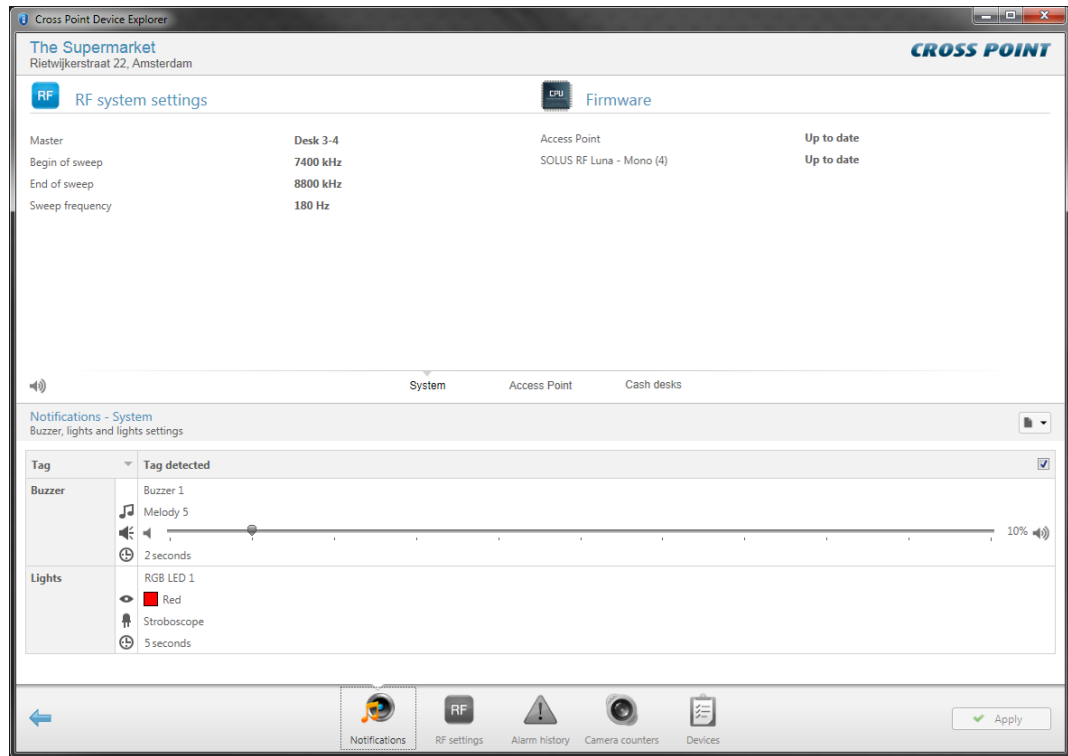


Figure 35: System information

The top-part of this screen shows information about the connected transceiver(s) and whether the firmware of all connected devices is up-to-date.

The bottom part shows the following tabs:

7.8.1 Notifications

In case of an alarm situation, notifications will be used to draw attention and to present information about the type of alarm.

Notifications can be set for all entrances at once by configuring the notifications in this System screen. In case different notifications per entrance are required, select the entrance and specify the required notification settings at entrance level. See section 7.7.4 for more details.



Notification settings, which are configured in this System screen, will be applied system-wide, which means to all devices connected to this Access Point. Any notification settings that have been configured for a specific entrance will be overwritten with the values that are specified in this System screen!

In case devices with normal LEDs and RGB LEDs are detected, a message indicating that it's not possible to configure notifications at system level will be shown.

Refer to section 7.7.4.1 for more details on the available notification settings.

7.8.2 RF settings

The RF settings screen enables you to configure various system settings for all RF Mono antennas that are connected. In case Checkout RF Deactivators are also connected, then synchronization for these devices settings can also be configured here.

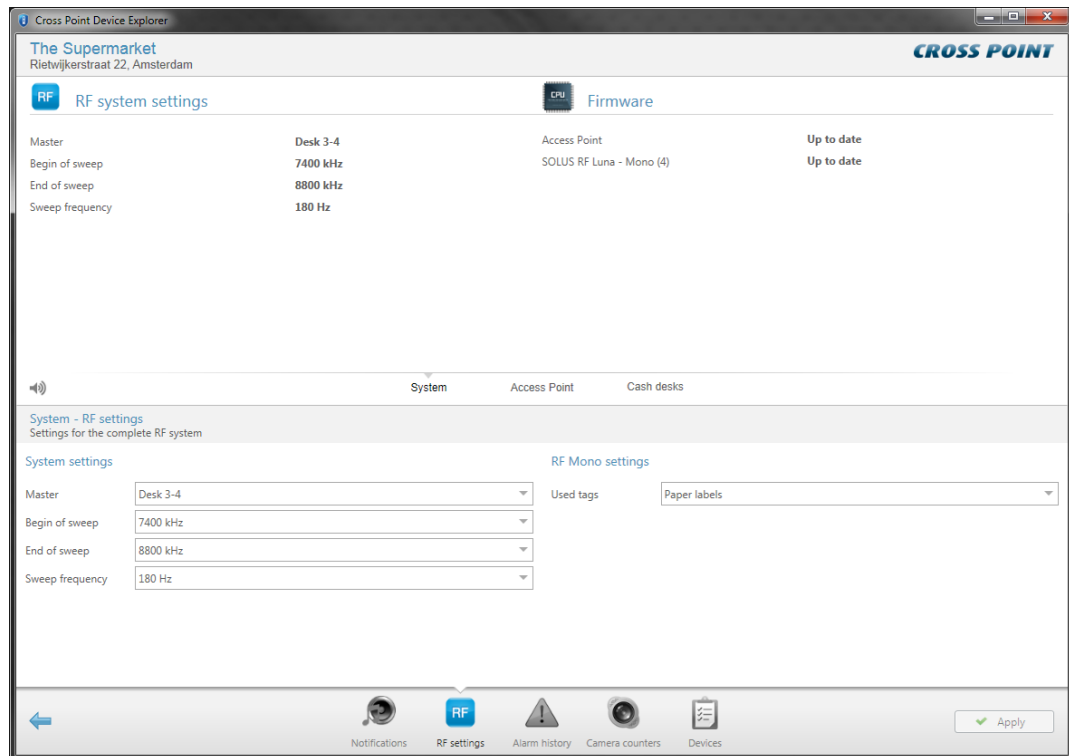


Figure 36: System settings

Only one master antenna is allowed on the Field Bus. Select one of the available antennas from the master drop-down box to appoint that antenna as master for the complete system. It is always recommended to select the antenna in the middle of the total bus as master.

The total transmission bandwidth is configured by selecting a Begin of sweep and End of sweep frequency. The default transmission bandwidth is 7400 kHz – 8800 kHz.

System setting	Explanation
Master	Master antenna selection
Begin of sweep	Bandwidth start frequency 7400 kHz, 7500 kHz, 7600 kHz, 7700 kHz, 7800 kHz, 7900 kHz or 8000 kHz
End of sweep	Bandwidth end frequency 8200 kHz, 8300 kHz, 8400 kHz, 8500 kHz, 8600 kHz, 8700 kHz or 8800 kHz
Sweep frequency	Set the desired sweep frequency 185 Hz (= default), 180 Hz, 175 Hz, 170 Hz

Table 5: System settings

RF Mono setting	Explanation
Used tags	<p>Select which types of tags are being used. The antenna can use Active Power Control (APC) to avoid paper labels being deactivated when moved too close to the antenna. Available tag options are:</p> <p>Paper labels: When a label moves closer to the antenna, the APC will become active and the transmission power will be reduced, to avoid deactivation of the paper label. When the alarm is triggered and the APC is active, the recovery time to full transmission power after the label is moved away from the antenna is longer.</p> <p>Hard tags: The APC is not activated when a paper label or hard tag is moved too close to the antenna. Paper labels might be deactivated in this case.</p> <p>Paper labels and hard tags: A combination of paper labels and hard tags is being used and the APC will be activated when tags or labels are moved close to the antenna.</p>

Table 6: RF Mono settings

7.8.3 Alarm history

The system's Alarm history screen shows a list of the tags that have been detected on the **entire** system (all antennas in all entrances). The information is retrieved from the antennas when you enter this screen, so it may take some time before the information is visible.

See section 7.7.4.1.6 for further details on the Alarm history.

7.8.4 Camera counters

This tab is always visible and will only contain information when Cross Point Camera Counters are connected to the same LAN as the CCAP. For further details please refer to user manual for the Camera Counter.

7.8.5 Devices

The Devices screen shows a list of all connected devices, their firmware status and some system settings.

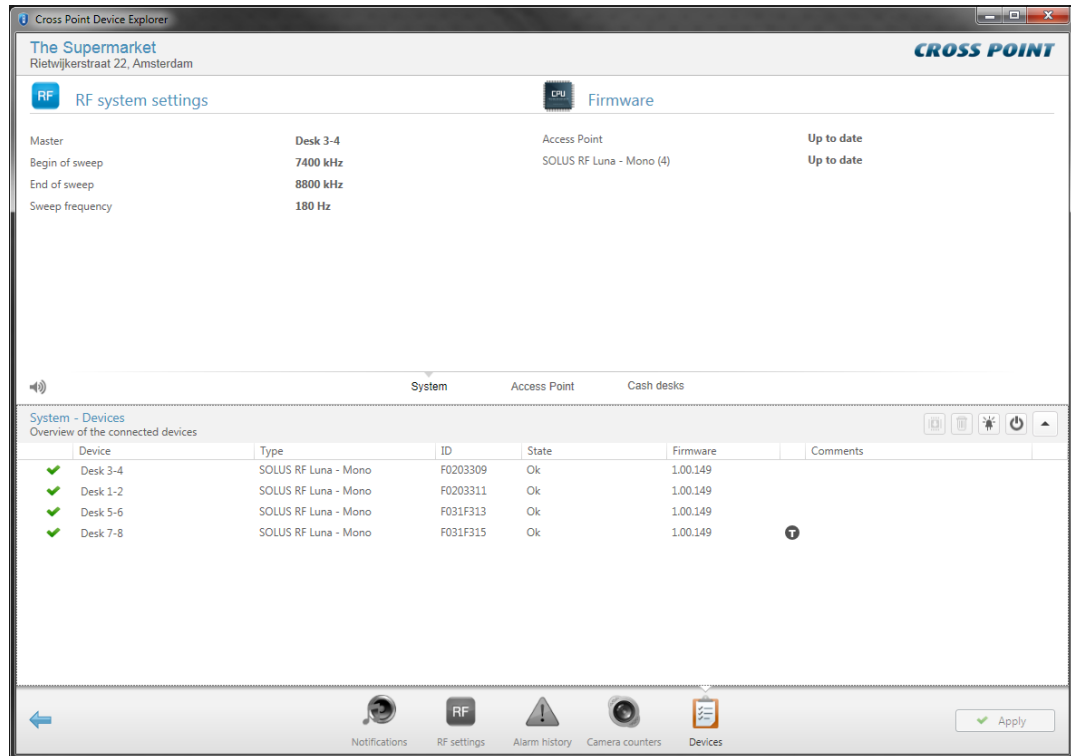





Figure 37: System – Devices

In the Devices list it is possible to:

- View the firmware version of each connected device
- View which device is terminated **T**
- Upload new device firmware
- Locate a device
- Reset a device
- Change the device name

Just move your mouse cursor over a device in the list and the **Locate**  and **Reset**  buttons for that device will appear.

7.8.5.1 Locating a device


Press the **Locate** button  once to activate the buzzer and/or LEDs on the selected device. The Locate icon will start blinking and will keep on blinking. Press the Locate button again to stop locating the selected device.

It's also possible to start locating a device through the context menu of a device. Just select the entrance and right-mouse-click on the antenna. The context menu will show and the Locate option can be selected.


7.8.5.2 Resetting a device

Press the **Reset** button  to reset only the selected device.


7.8.5.3 **Uploading new firmware**

In case new firmware is available, you can automatically upgrade all devices of the same type by pressing the **Update all** button .

7.8.5.4 **Removing disconnected devices**

All devices that have the disconnected status can be removed permanently by pressing the **Remove disconnected devices** button .

7.8.5.5 **Turning all LEDs on/off**

The LEDs on all connected devices can be switched on at once by pressing the **Turn all LEDs on** button . This is useful to check whether all devices are connected, especially in large installation. Press this button again to switch all LEDs off again.

7.8.5.6 **Resetting all connected devices**

Press the **Reset all** button  to reset all connected devices at once.

7.8.5.7 **Changing the name of a device**

Move your mouse cursor over the device name of the device in the Device column and a text field will appear. Click on the text field of the device you want to change and enter the new name. Repeat this for all names you want to change. Click the Apply button to save the new settings.

8 Combining the RF Checkout Deactivator

In case RF deactivators need to be installed in combination with the RF mono system, the RF Checkout Deactivator must be used. The RF Checkout Deactivator is especially designed for use with the RF Mono system. When integrated into the field bus, this deactivator will properly synchronize with the RF Mono system, resulting in best performance.

8.1 Integration in barcode scanners

The RF Checkout Deactivator is supplied **without** an antenna plate. When used in a checkout environment with barcode scanners, most of these scanners nowadays already have a deactivation wire integrated in the scanner. This deactivation wire can be connected to the RF Checkout Deactivator. If such a deactivation wire is not available, then it must be integrated by you. If you should still require deactivator antenna plates, then these are optionally available.

8.2 Power supply

The RF Checkout Deactivator is supplied **without** a power supply, because for synchronization purposes it must be integrated into the field bus that also contains the RF Mono antennas. The RF Checkout Deactivator will then receive its power supply through the UTP cable from the RF Mono antennas. It will also forward the power supply to the next connected device.

8.3 Field bus connections

Figure 38 shows a top view of a checkout environment with single and back-to-back checkouts. Four RF Mono antennas and seven RF Checkout Deactivators are installed. The field bus connections between the RF Mono antennas and the RF Checkout Deactivators are represented by the dashed blue line.

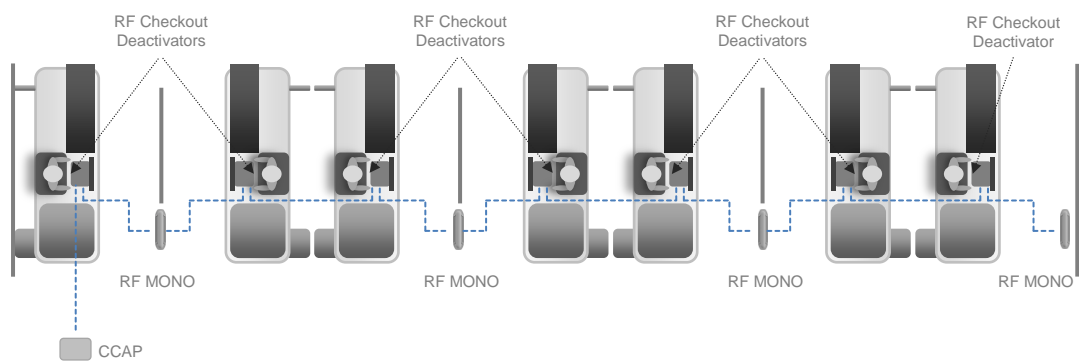


Figure 38: Field bus connections between RF Mono and RF Checkout Deactivator

9 Quick installation and system configuration

This chapter will guide you through the installation and configuration of the RF Mono system.

1. Carefully check the area where the RF Mono antenna is going to be installed for potential noise sources. Follow the guidelines and instructions in chapter 3.
2. Once the exact position has been determined, properly install the RF Mono antenna(s), power suppl(y)(ies), wiring, RF Deactivators and CrossCONNECT Access Point (CCAP). Follow the instructions in chapters 4, 5 and 6.
3. Terminate the bus on the last device by putting the termination switch on the PCB of that device in the ON position. The termination switches on all other devices should be OFF. In case another device, for example an RF Deactivator, is the last device on the bus, then the deactivator must be terminated. See chapter 5.4 for more information on bus termination.
4. Switch the power supplies of the RF Mono antenna(s) and CCAP on and make sure the power LEDs on all connected devices are lit.
5. Connect your laptop to the CCAP or to the same LAN if the CCAP is connected to a LAN, Start Device Explorer and logon to the CCAP. Follow the instructions in chapter 7.
6. Check if all devices appear in the System – Devices screen and verify that all devices have the state Ok.
7. In case of multiple devices, locate each device using the Locate option as described in chapter 7.8.5.1 and give it an appropriate name.
8. Go to System - RF settings and select the appropriate master.
9. Create entrances, move antennas to the appropriate entrances and properly arrange them or perform an automatic antenna arrangement (for Optima models only). See chapters 7.6 and 7.7.7.7
10. Select the first RF Mono antenna and configure the correct time slot. Repeat this for all RF Mono antennas. See chapters 6.2.2 and 7.7.5.1.7.
11. Select the first transceiver and adjust its detection sensitivity so it will properly detect the used paper labels and/or hard tags. Repeat this for all transceivers. If necessary reduce the detection bandwidth. See chapter 7.7.5.
12. Adjust the notifications for each entrance. See chapter 7.7.4.1.

10 Regulatory information

FCC WARNING

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

NOTE 1: This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates uses and can radiate radio frequency energy and, if not installed in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

NOTE 2: Any changes or modifications to this unit not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

IC WARNING

This device complies with Industry Canada's license-exempt RSSs. Operation is subject to the following two conditions:

(1) This device may not cause interference; and

(2) This device must accept any interference, including interference that may cause undesired operation of the device.

Le présent appareil est conforme aux CNR d'Industrie Canada applicables aux appareils radio exempts de licence. L'exploitation est autorisée aux deux conditions suivantes: (1) l'appareil ne doit pas produire de brouillage, et (2) l'utilisateur de l'appareil doit accepter tout brouillage radioélectrique subi, même si brouillage est susceptible d'en compromettre le fonctionnement.