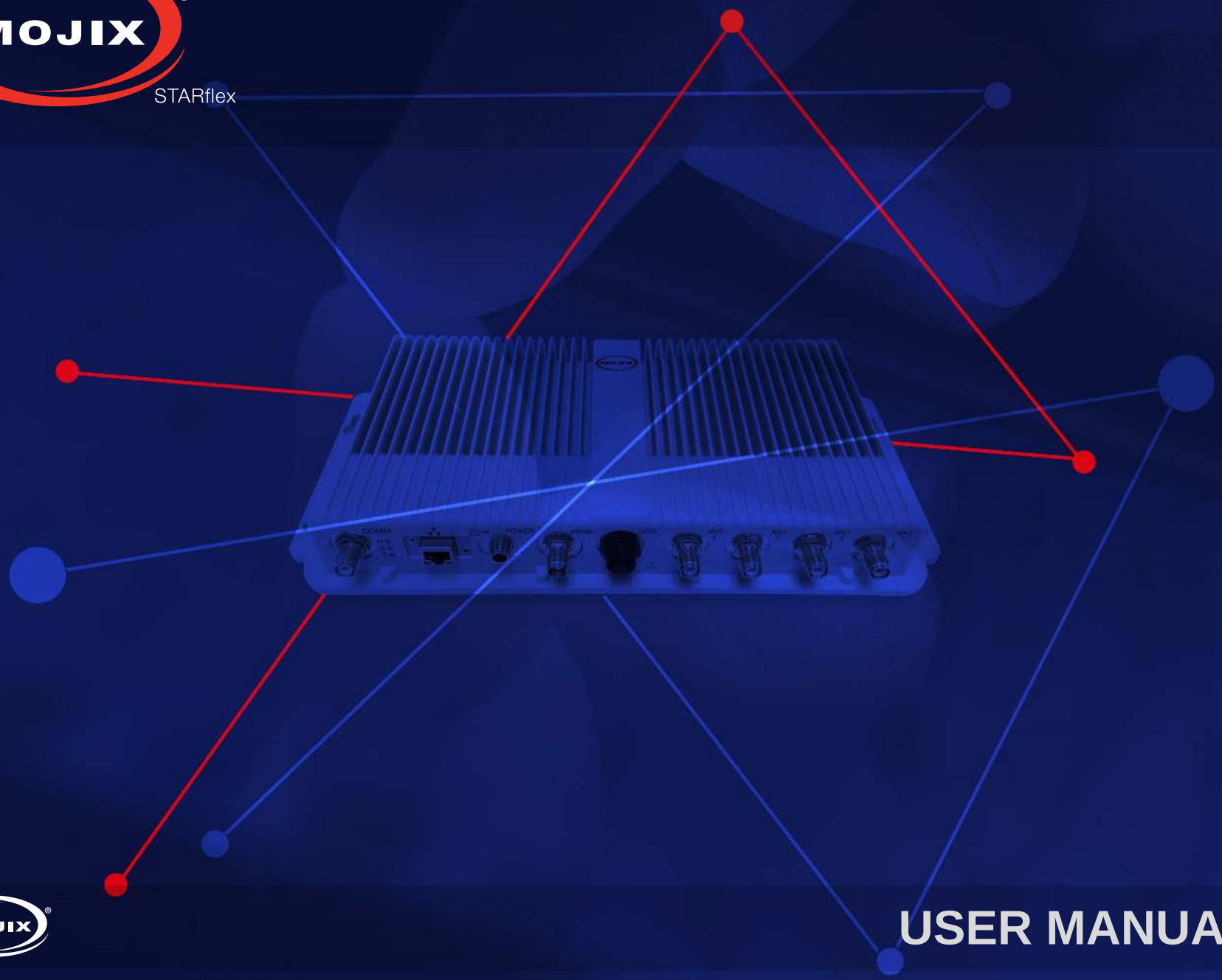
MOJIX®

STARflex



USER MANUAL

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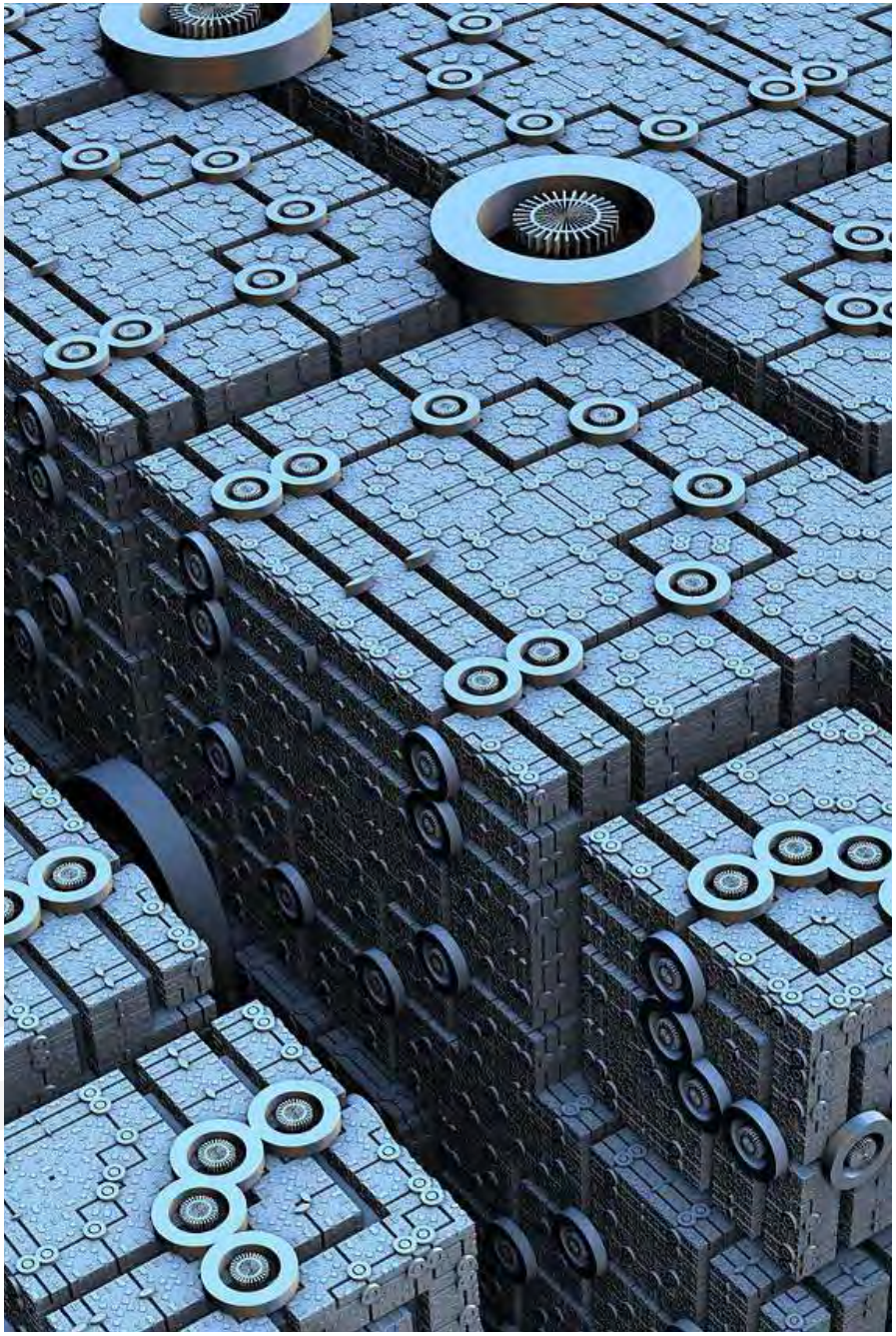

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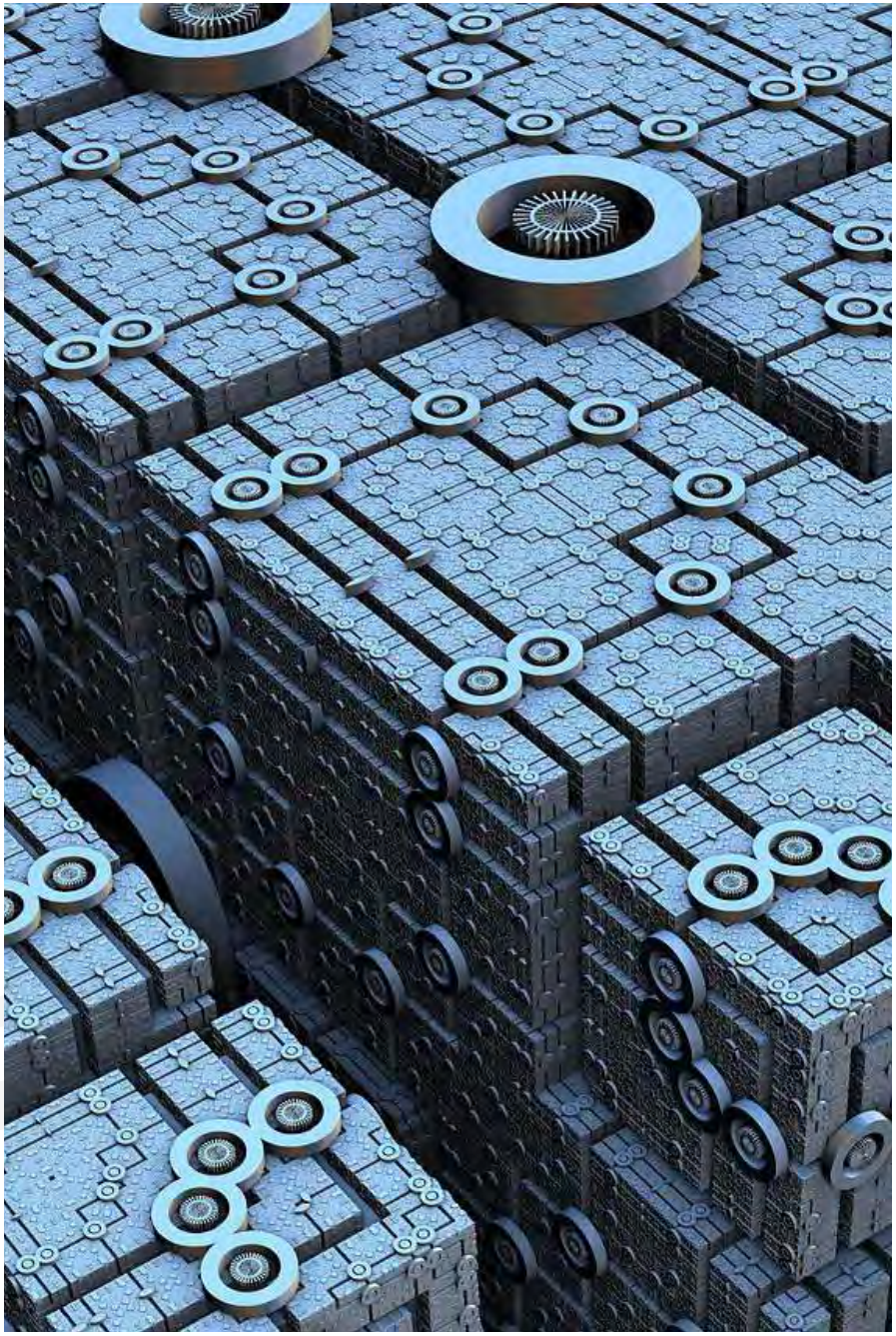
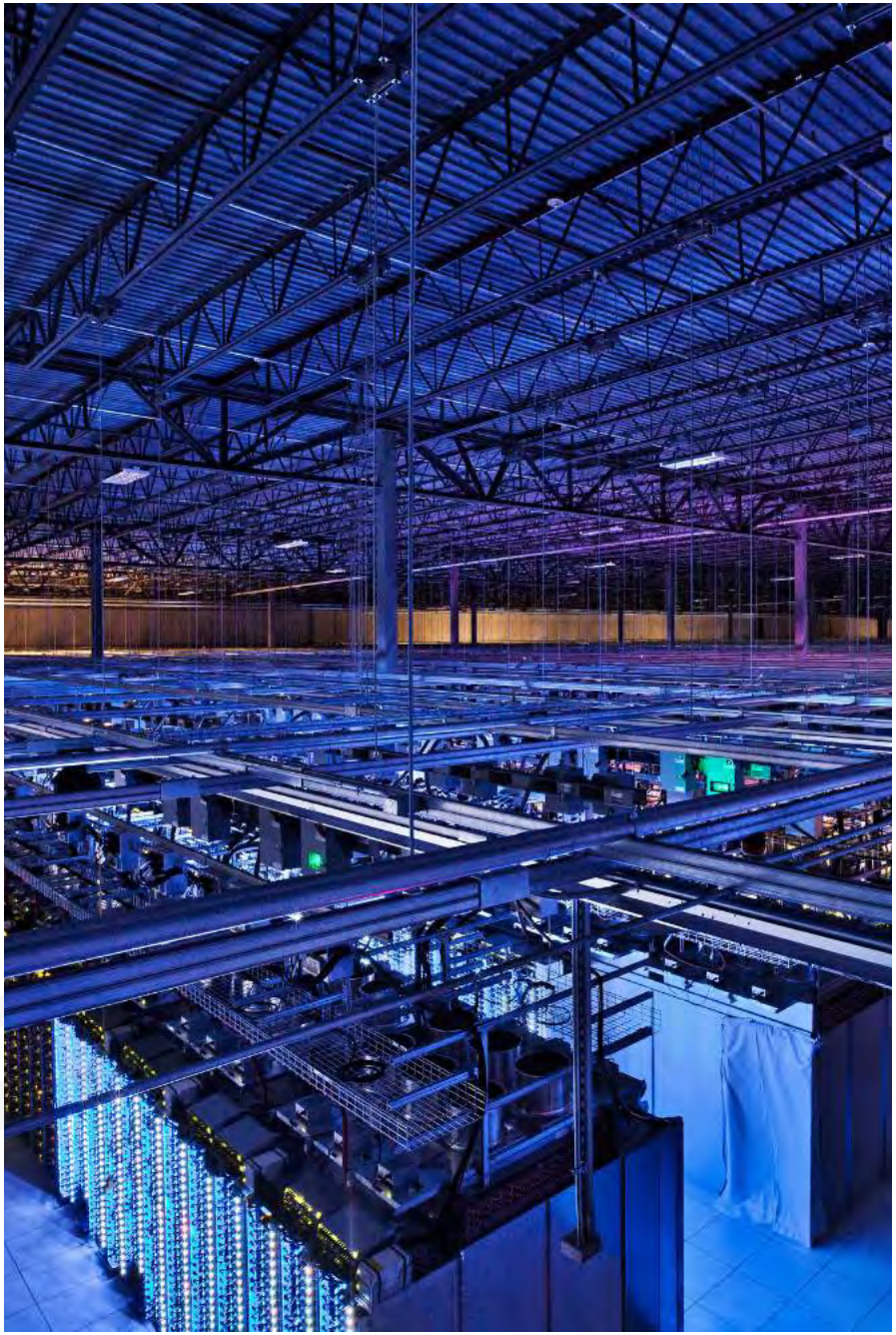


CHAPTER I: INTRODUCTION

1.1 OVERVIEW

The STARflex reader combines the high performance and real-time location capabilities of the STAR distributed excitation architecture with highly flexible new options for antenna topology and software integration.
While suitable for use in both indoor and outdoor scenarios, STARflex is optimized for cost effective, easy-to-deploy solutions for enclosed environments such as real-time inventory management, ambulatory patient flow management and asset tracking in retail, healthcare and industrial scenarios. Very high receiver sensitivity enables the STARflex to perform well in indoor applications where reflections from metal shelves, equipment and fixtures interfere with line-of-sight between the reader and the tag reducing read rates for other readers.



The STARflex software architecture is optimized for simplicity and resilience in order to enable fast deployment of robust distributed systems. For tag data, STARflex features native support for the lightweight MQTT device protocol. To simplify and speed integration, STARflex provides a RESTful API for control and status. Users can implement business logic software directly on the reader using this RESTful interface, or by using the modern and ubiquitous node.js web framework. Out-of-the-box the reader connects to ViZix.Mojix.com, enabling users to have their STARflex up and sending tag data into the cloud in minutes. An intuitive web interface simplifies configuration of individual readers.

HIGH PERFORMANCE HARDWARE DESIGN

- Distributed excitation architecture scales efficiently to 48 antennas per reader
- Dual receivers provide the highest sensitivity available in a 4-port reader
- Compliant with EPC Gen2V2, ISO 18000-6c.
- TrueRTLS™ location precision when used with the Mojix RTLS MCON appliance

FLEXIBLE SOFTWARE ARCHITECTURE

- RESTful API
- JSON and MQTT payload options
- Node.js support
- Support for local execution of user code via RESTful API or shell access (expert)
- Automatic phone-home registration process speeds
- Compatible with ViZix IoT software platform
- Easy automatic “phone-home” setup process out of the box

1.2 KEY CONCEPTS

There are some key concepts mentioned throughout this manual that will be useful to understand. The following glossary of acronyms are used in many of the sections.

TERM	DEFINITION
API	Application Programming Interface
CSV	Comma-separated Values
dBm	Decibel-milliwatt
DHCP	Dynamic Host Configuration Protocol
DNS	Domain Name System
eNode	A reliable, autonomously operated simple RF repeater designed to excite all EPC UHF Gen 2 RFID tags within their designated interrogation spaces.
EPC	Electronic Product Code - An ultra-low-cost RFID tag containing a 64-bit or 96-bit unique ID codes.
LED	Light-emitting Diode
MAC Number	Media Access Control Number
NTP	Network Time Protocol
RFID	Radio Frequency Identification
Tag	An RFID device capable of receiving reader signal and returning data to the reader.
TxID	Transmit Antenna
UI	User Interface

1.3 OPERATING REGIONS

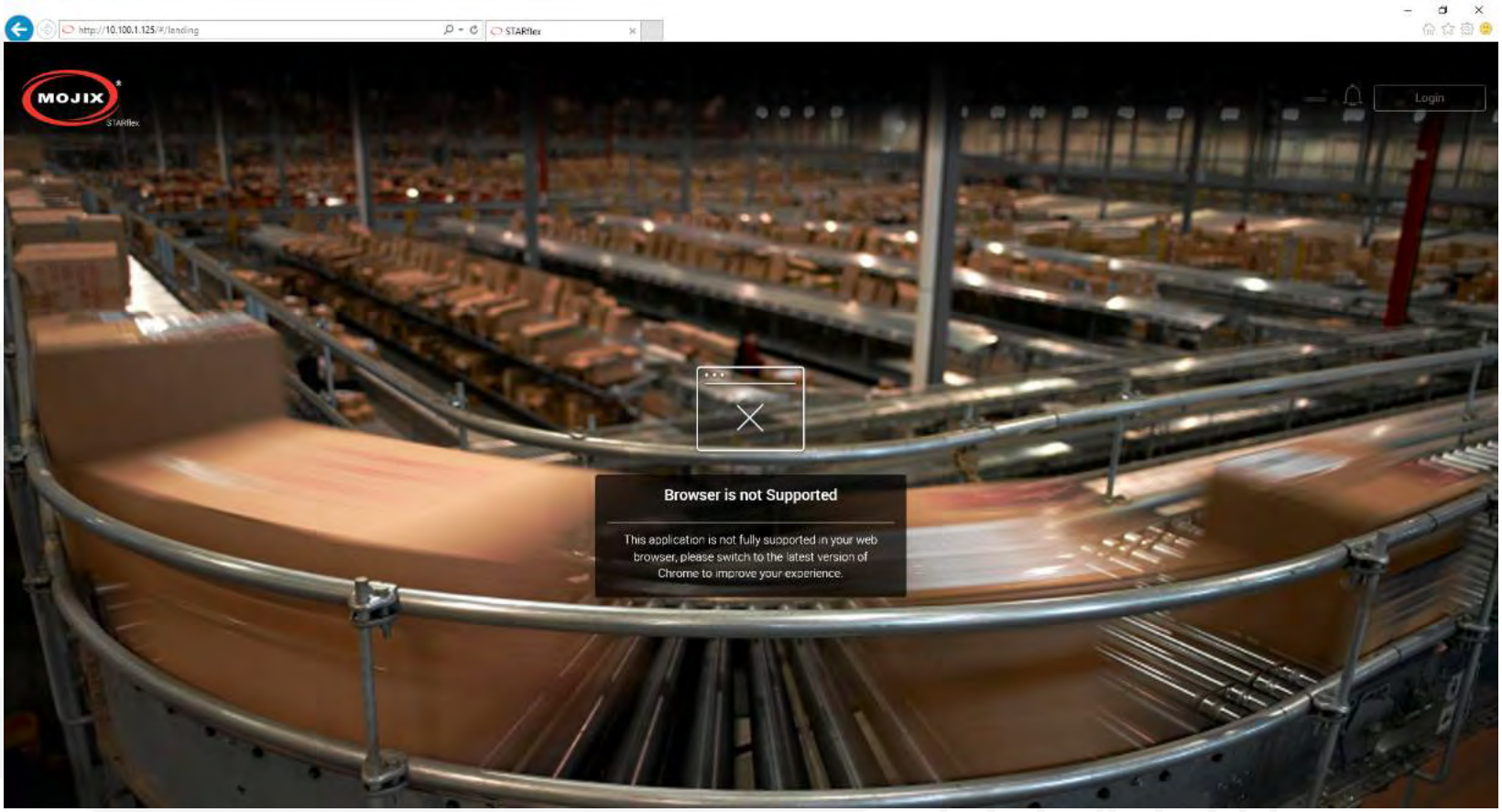
The STARflex operates in multiple regions under each region's regulatory jurisdiction rules. The following table indicates all supported models of the STARflex and their corresponding operating regions.

STARflex Model Number	Supported Equipment Models for eNode and TurboAntenna	Region
STR-400-F	ENM-3004-F, TMA-2000	United States
STR-400-E	ENM-3004-E, TMA-2000	Europe, UK, Middle East
STR-400-J	ENM-3004-J, TMA-2000	Japan
STR-400-K	ENM-3004-K, TMA-2000	Korea
STR-400-HK	ENM-3004-HK, TMA-2000	Hong Kong
STR-400-B	ENM-3004-B, TMA-2000	Brazil
STR-400-CH	ENM-3004-CH, TMA-2000	China
STR-400-A	ENM-3004-A, TMA-2000	Australia
STR-400-TW	ENM-3004-TW, TMA-2000	Taiwan
STR-400-I	ENM-3004-I, TMA-2000	India
STR-400-ZA	ENM-3004-E, TMA-2000	South Africa
STR-400-CA	ENM-3004-CA, TMA-2000	Canada

NOTE: STARflex jurisdiction settings are set at the factory and are not able to be changed in the field.

1.4 BROWSER REQUIREMENTS

The following browsers are currently supported for SF web interface:
Latest version of Google Chrome.
Latest version of Mozilla Firefox.
Microsoft Internet Explorer is not supported, if acces is attempted from this browser the following message will be displayed:



1.5 MOBILE REQUIREMENTS

The iOS supported is version 8 or higher.The optimum resolution of the screen recommended for mobile and touch devices is 768x768, the application works correctly in devices with less resolution, however a complete view of certain sections such as the Tag Viewer might be impacted at user experience level.

CHAPTER II: BASICS

2.1 QUICK START

2.1.1 ACCESSING THE STARFLEX WEB INTERFACE

After the STARflex has been connected to a network and powered on, the next step is to access the STARflex's Web interface to perform the configuration tasks and verify the STARflex is reading RFID tags.

Note: In order to avoid Damage to the STARflex, power cable must be connected to the Starflex before connecting it to the power outlet .

In case that no DHCP service is available, a temporary static IP address is assigned for a period of ten minutes. Review the sticker label printed on the STARflex unit. The IP address printed on the label will look like this: 169.254.y.z where y and z will vary from unit to unit.

2.1.2 “PHONE-HOME” REGISTRATION

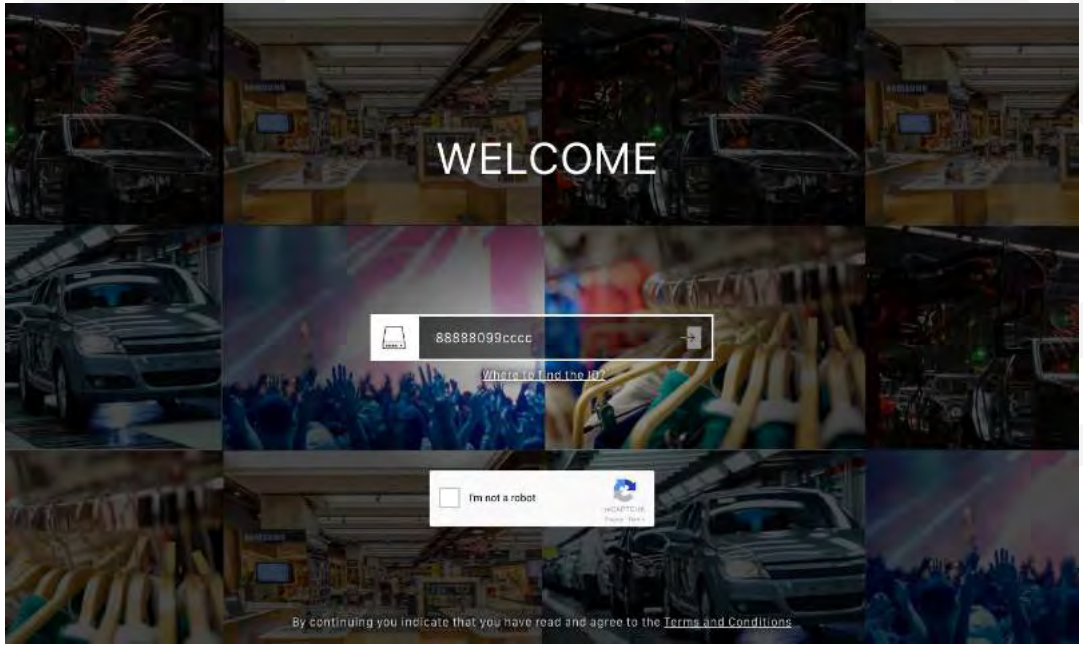
The STARflex is preconfigured to self-register with the Mojix Vizix cloud application if the unit is able to connect to the Internet. The purpose of this registration is to enable users to have a simplified, cloud managed solution for managing STARflex readers. Vizix provides the capability to bring up a STARflex reader and process RFID tag read data in a matter of minutes.
Self registration can be disabled by adding a license.
In order to get the license please contact Mojix personnel.

Registering the Device in ViZix

The STARflex device must be connected to the Internet so it activates the phone home to create its corresponding hierarchy in the ViZix platform. The device will be created as a new STARflex Thing which will have the discoveryDate and the association fields of the STARflex left blank until the device is claimed in the registration platform.

The Registration Wizard

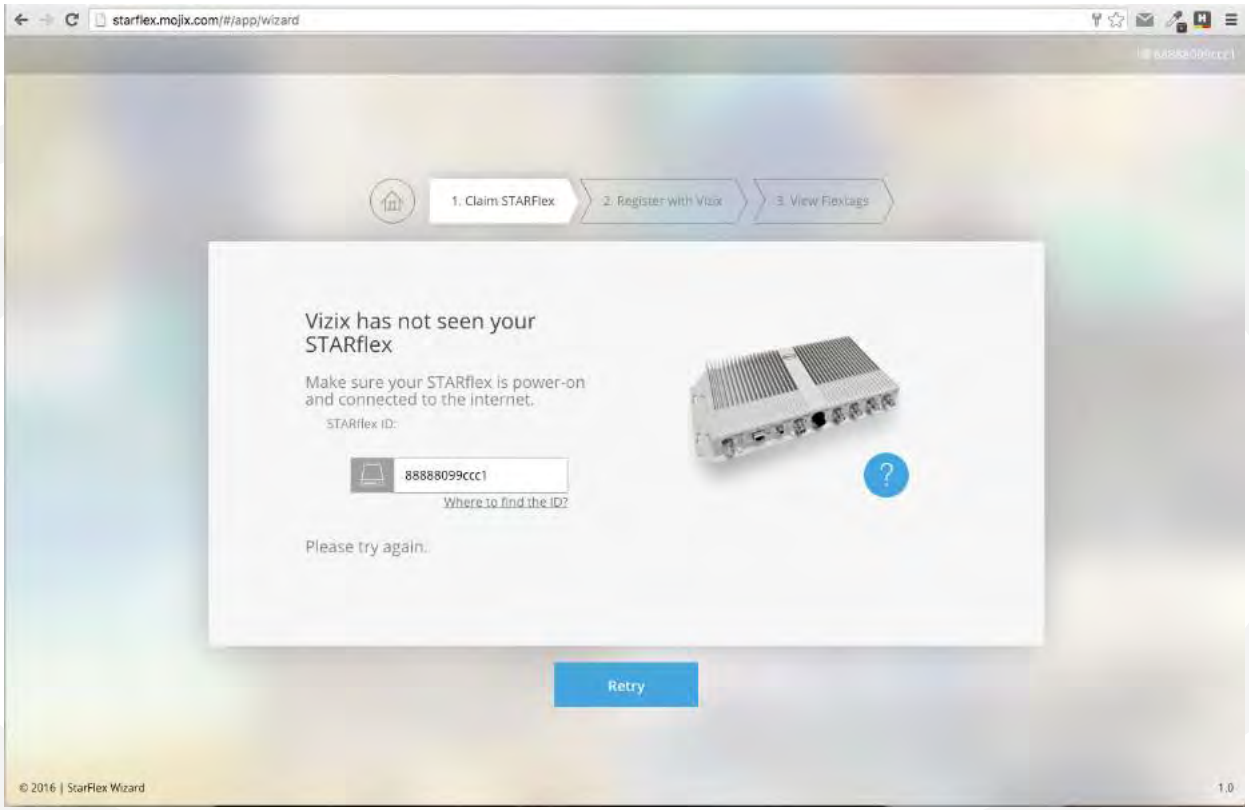
In a browser window go to the Registration Wizard address and the login page will be shown. To login, it is necessary to enter the serial of the STARflex device (already registered in ViZix), this serial should be the same unique code of the device which could be its barcode (usually located at the back of the device) or its MAC address.



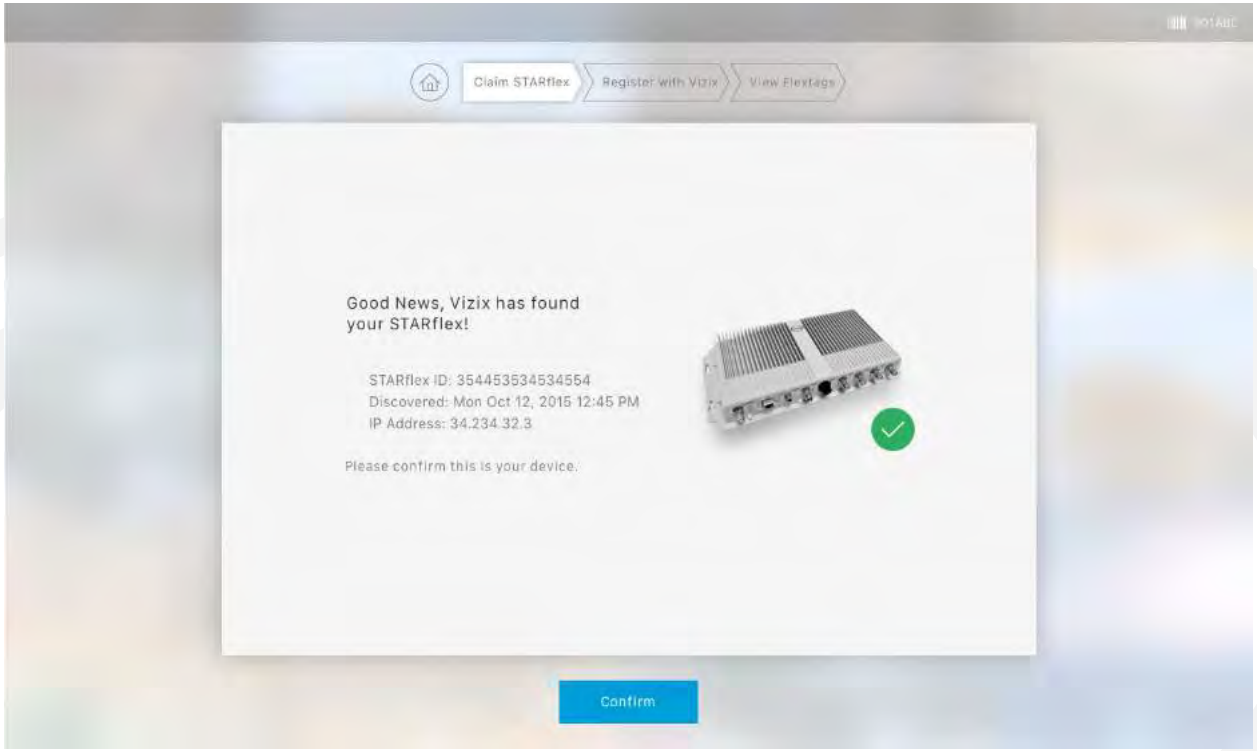
Enter the serial with which the device is registered in ViZix in the **ID/Serial Number** field, check the I’m not a robot captcha, complete its challenge and click on the left arrow of the field to start the wizard.

Claim STARflex

The wizard first verifies that the device is registered in the ViZix platform. If the serial of the device entered is not registered in ViZix or the serial is incorrect, the first step will show a message indicating that ViZix has not seen the STARflex (it means that is not registered in the ViZix platform). Enter the correct serial code and click on **Retry** to verify once again that the STARflex is registered in ViZix.

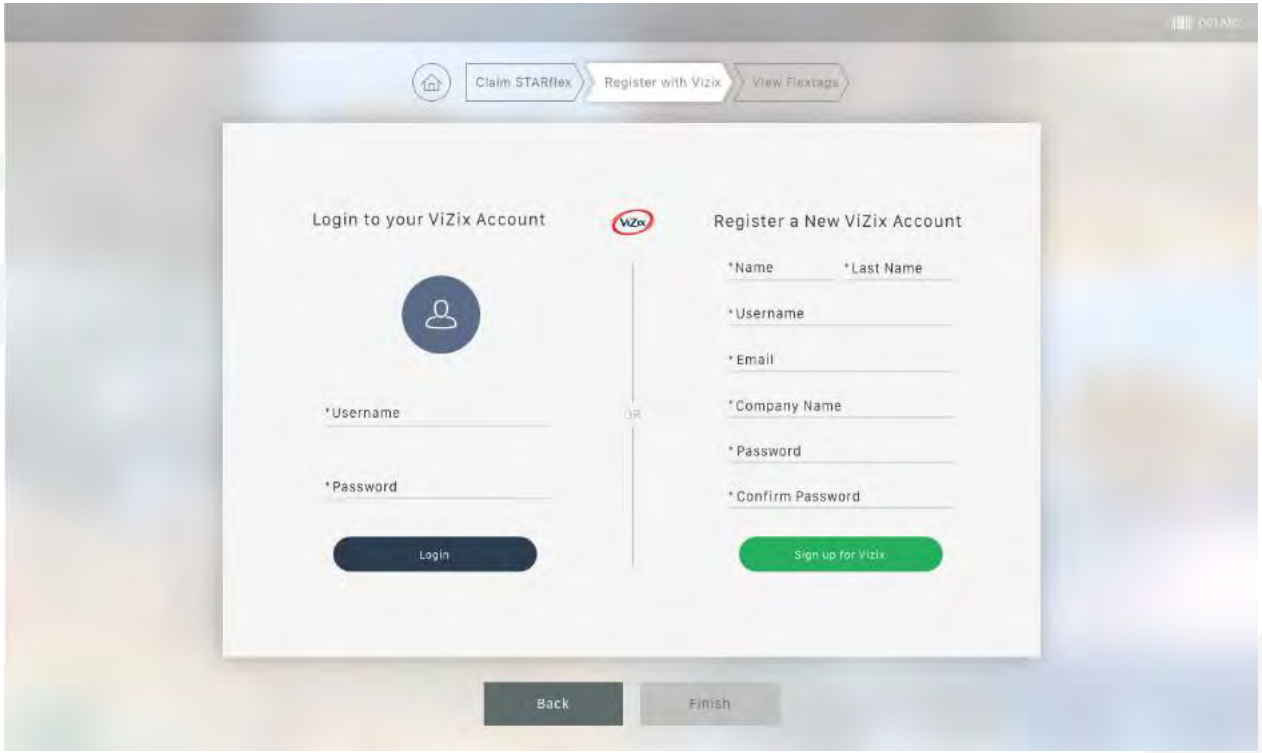


If the entered serial is correct, then the following window will be shown in the first step of the wizard:

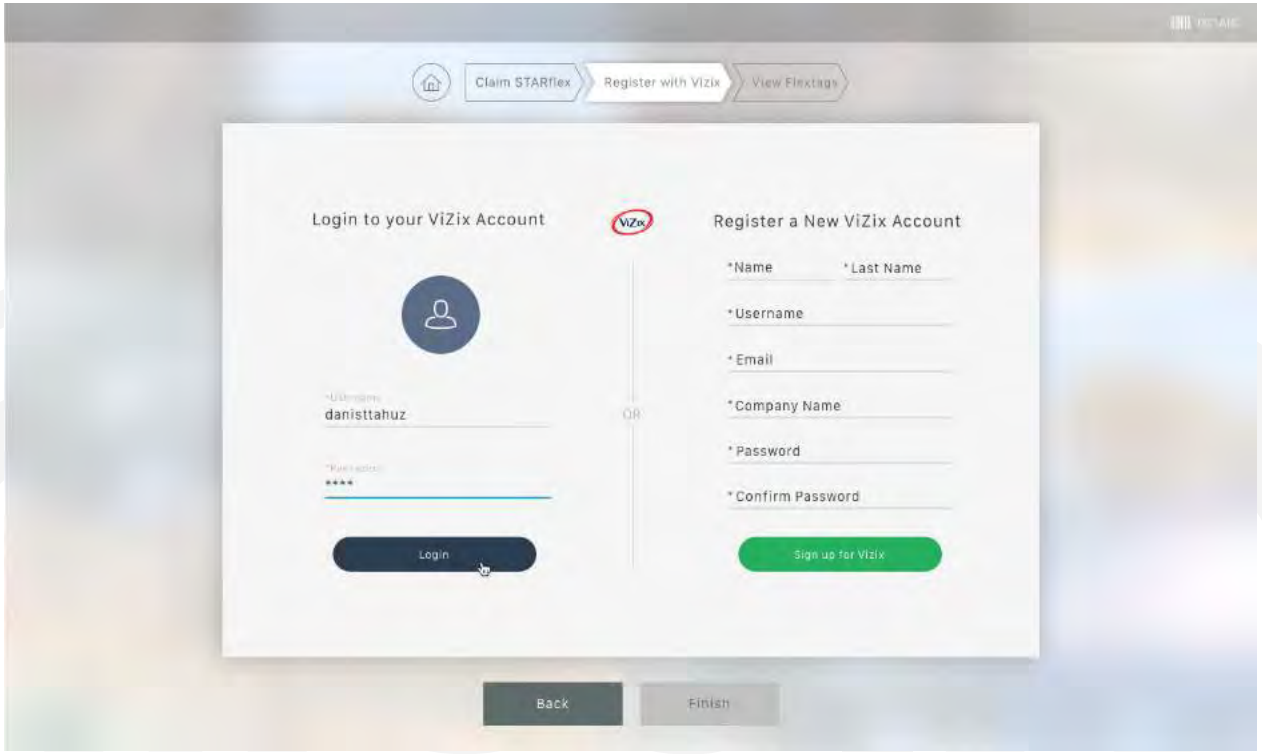


Register with ViZix

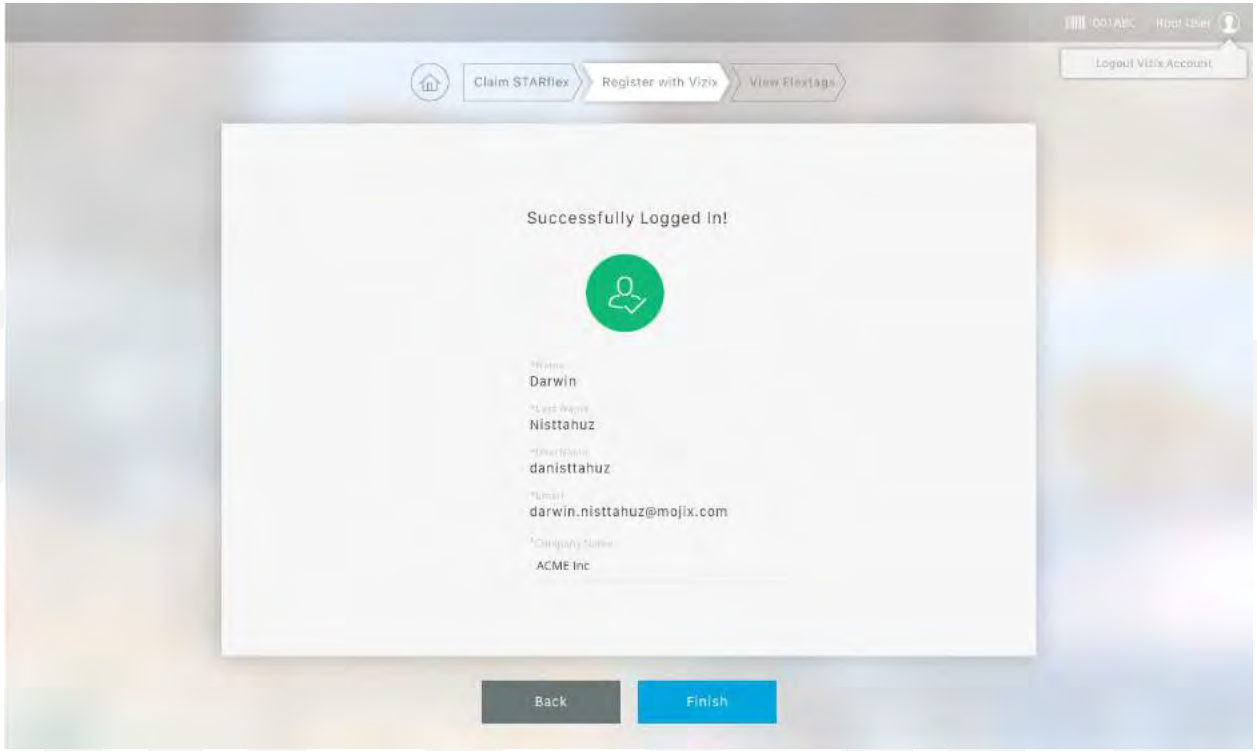
To claim the device it is necessary to have a user registered in the ViZix platform. In the second step of the registration there are two options to connect to ViZix; the first one is using an already registered user in ViZix and the second is to register to ViZix by creating a new account.



If using an existing account in ViZix then, enter the corresponding credentials in the Login to your ViZix Account section at the left side and click on Login to claim the device with that user.

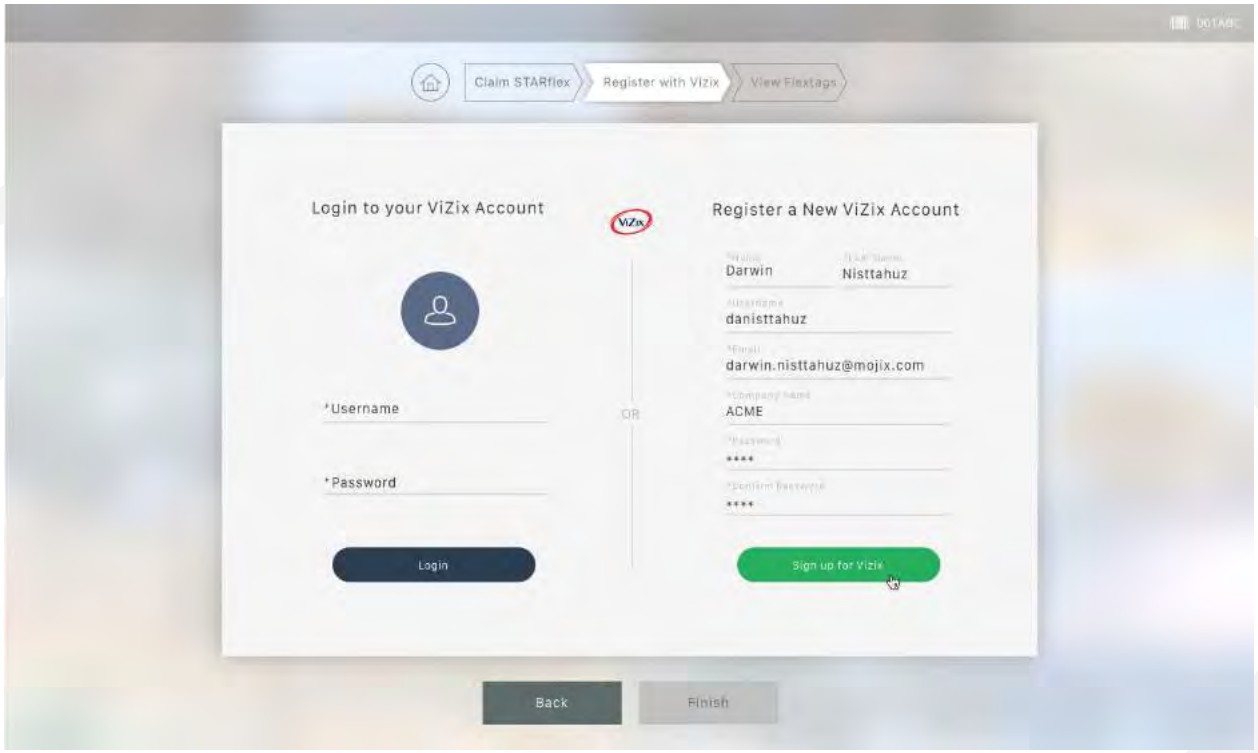


If the account exists in ViZix, the information of the ViZix user, his/her name, last name, username, email and the company name will be shown.



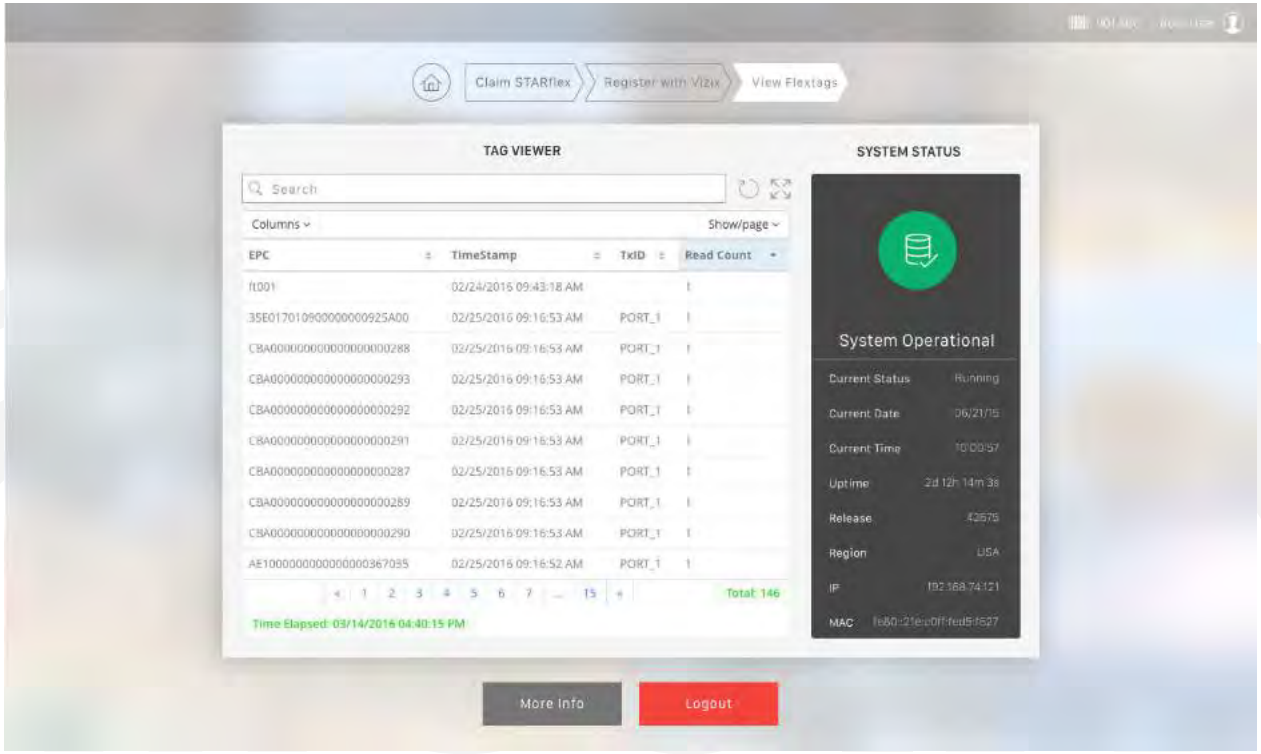
Click on Finish to go to the final step.

On the other hand, to create a new account in ViZix, fill in the form at the right side in the Register a New ViZix Account panel and click on Sign up for ViZix to register the new account

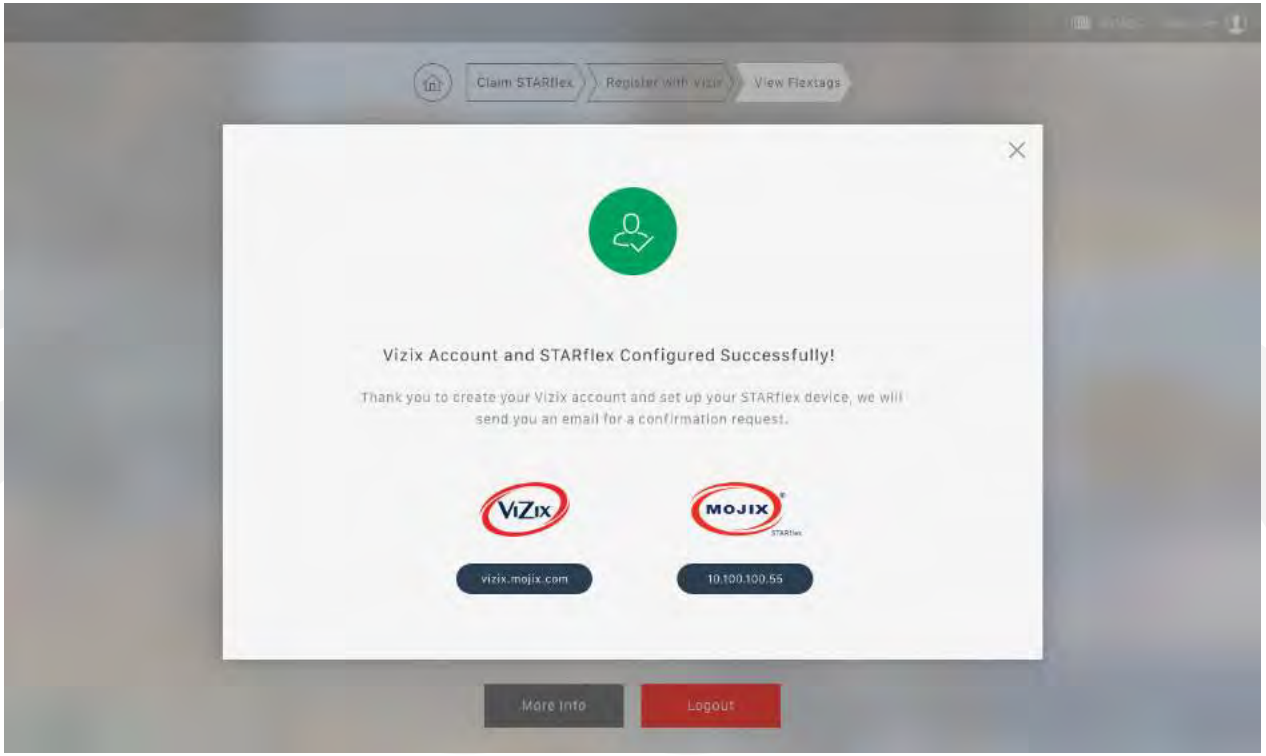


View Flextags

The last step shows the tags associated to the STARflex as a test that the connection is valid. The information of the device is shown in the right panel and the information of the tags associated to the device is shown in the left panel.

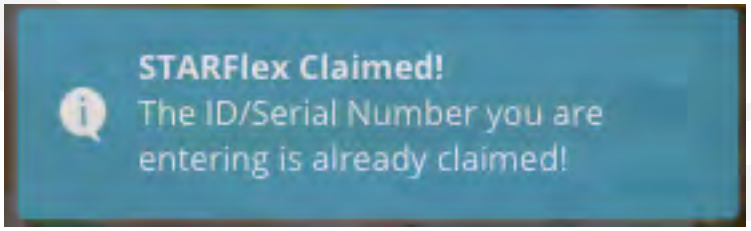


Click on More Info to open the window with the message indicating that the ViZix account and STARflex configured successfully. This window has two options to continue to the ViZix console (at the left) or go to the micro stack console of STARflex (at the right).



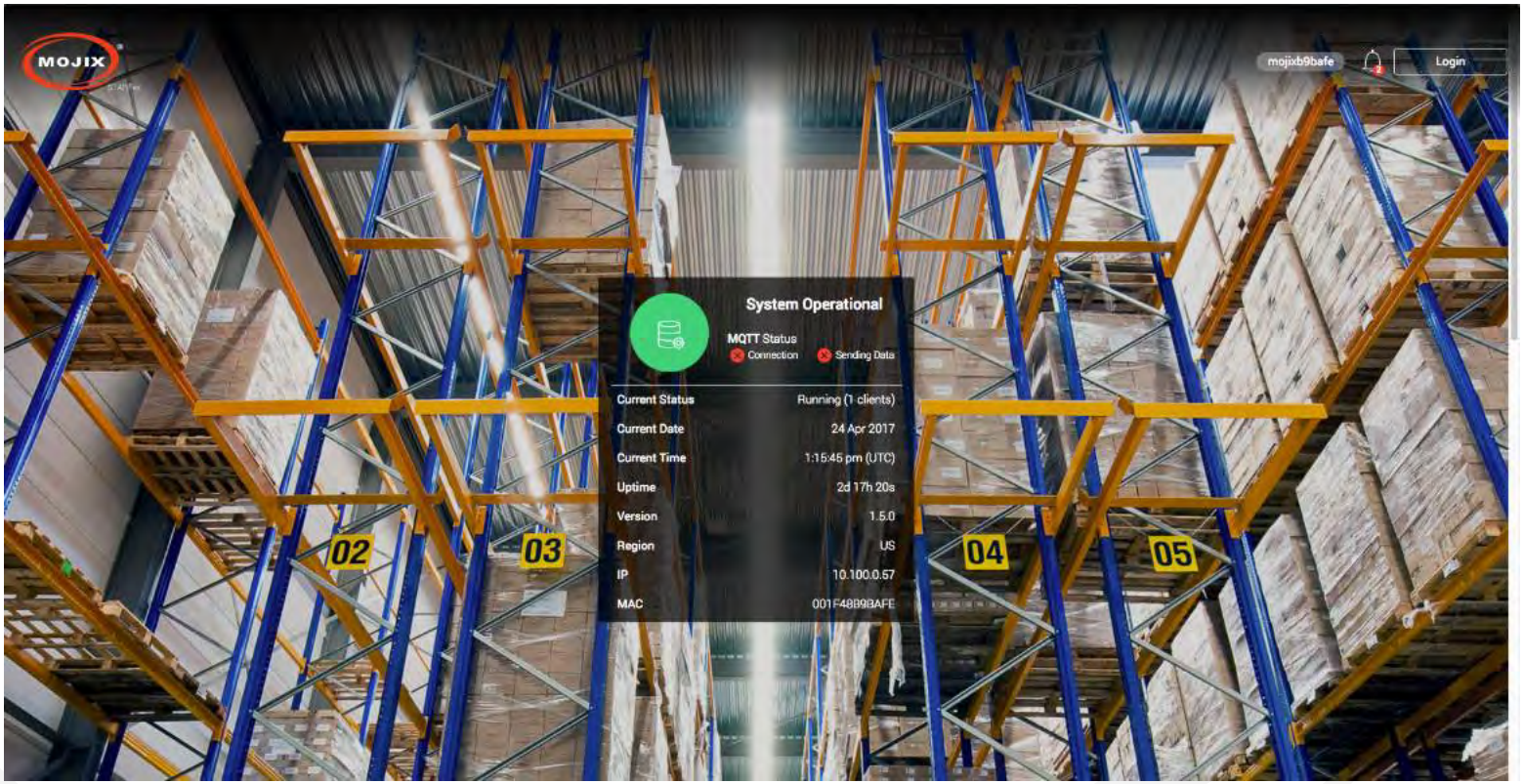
Close this window by clicking on the X icon at the top right corner of the window or by clicking on any space out of the window.

To finish the registration process, click on the Logout button and the login page will be shown again. If the ID/serial number of an already claimed device is entered in the platform, a message indicating that the STARflex as already been claimed will be shown.



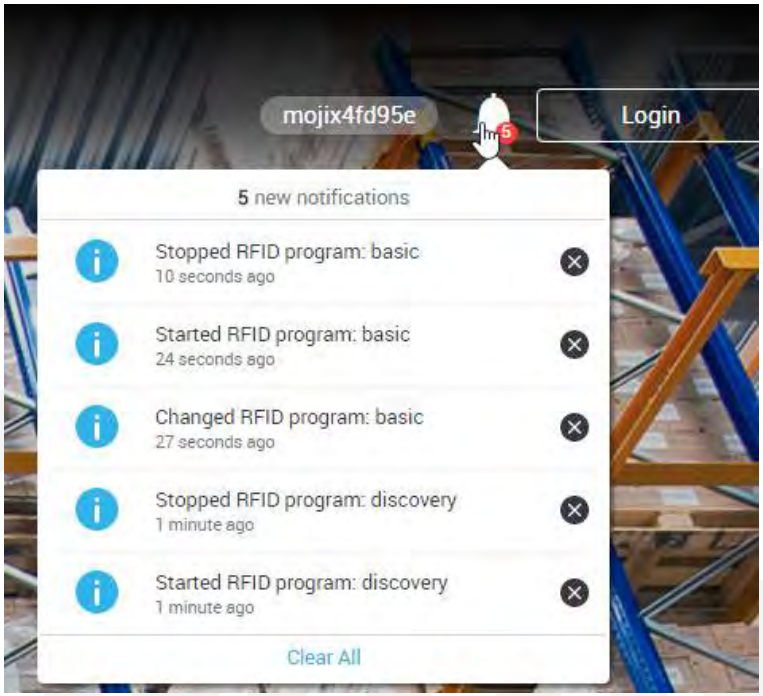
2.1.3 HOME PAGE

Once you access to the STARflex Web Interface, the home page is displayed.



At the top of the page the default hostname of the corresponding STARflex is located, the bell icon showing the number of new notifications and the button to login to the application are displayed.

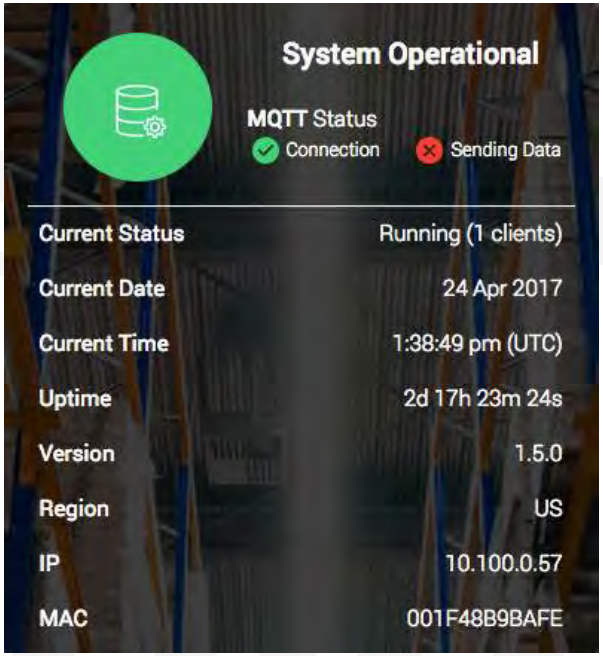
Clicking on the bell icon displays a list with the available notifications (exceptional conditions like low flash memory warnings, etc). It is possible to clear the list of messages one by one or all at once.



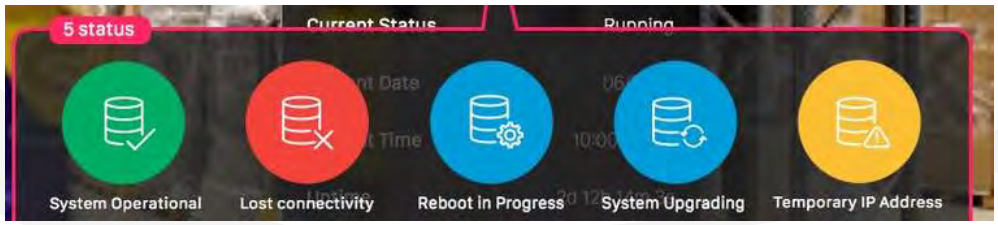
In the main menu, there is the information related to the STARflex explained below:

a. System Operational

This shows the current status of STARflex along with information related to the server.



At the top of the System Operational information, an icon showing the current status of the STARflex. There are 6 possibilities:



1. **System Operational**, (Green with a check mark) is indicated when the system is running correctly but no RFID program is running.
2. **Lost connectivity,** (Red) is indicated when there is no connectivity with the STARflex.
3. **Reboot in progress** (Blue) indicated when rebooting
4. **System Upgrading** (Blue) indicated when the system is Upgrading
5. **Temporary IP Address**, (Yellow) is indicated when the IP address is temporary (10 Minutes) and the operating IP address has not been configured yet.
6. **System Operational,** (Green with a running engine) is indicated when the system is running correctly and a RFID program is running as well.

When the STARflex is set to **Temporary IP Address** the following message will appear: *Go to Network Settings to change the configuration to DHCP or static IP address*.

On top there is also the MQTT Status displaying two icons:

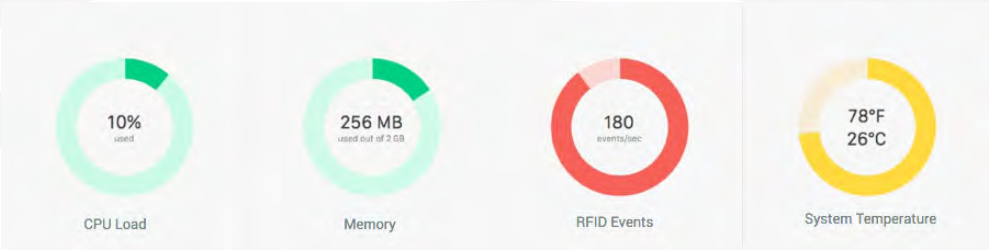
1. Connection: It has two possible options, when the icon is Green it means STARflex is connected to configured MQTT broker., when it is Red it means that STARFlex is not connected to MQTT broker.
2. Sending Data: It has two possible options, when the icon is Green it means that STARflex is sending data via MQTT, when it is Red it means that STARflex is not sending data via MQTT.

Additionally, further information can be presented:

- **Current Status:** It has two possible values: "**Running**", when a RFID program is running and "**Idle**" if no RFID programs are running. The number of clients is also displayed.
- **Current Date.** It shows the current date according to the Time Zone configured inside the Network Settings configuration.
- **Current Time.** It shows the current time according to the Time Zone configured inside the Network Settings configuration.
- **Uptime:** The current time the STARflex has been up and running.
- **Version:** The release version of this STARflex.
- **Region:** Shows the current frequency regulation of the STARflex.
- **IP:** The IP address configured or assigned to this STARflex.
- **MAC:** The mac address of this STARflex.

b. Server Information

Following, the STARflex status section is represented in four graphics that display information about the CPU load, the disk space, the number of events per second and the system temperature. The graphics will be displayed in three possible colors: red, yellow or green. The color will depend on the health status at that moment, green color means optimal performance, yellow color means warning and red color means error.



For example, the **CPU load** at optimum is under 80%, above that point the status is indicated as warning until 95% is reached which is indicated as an error. For the **memory space** status the optimum is above 70%, between 30% to 70% the status is indicated as warning and below 30% is indicated as an error. For the **events per second** the status color optimum is below 400 events/sec, the warning between 400 and 700 and above 700 is error. For the **system temperature** the values are displayed in Fahrenheit and Celsius degrees, the optimum is under 70 Celsius degrees, the warning between 70 and 85 degrees, and above 85 is an error.

c. Peers List

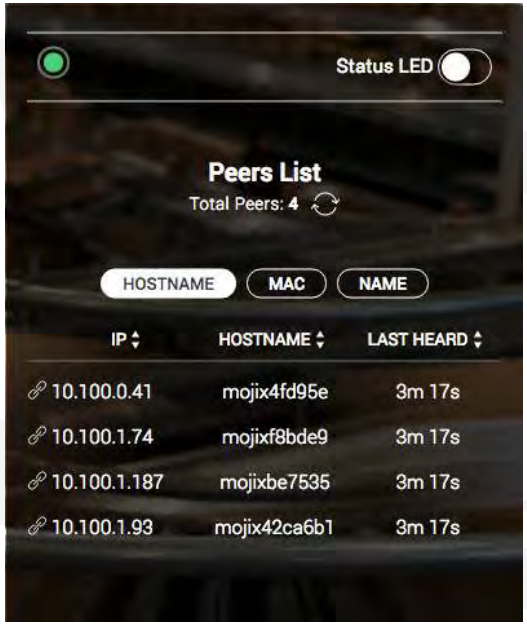
The details section displays a list of other STARflex's discovered on the network.

API Status LED

On the top of the STARflex is a LED indicator and a switch named "Status LED". There are four possible LED indications reported from the API (GET config/led): **on, off, blink** or **keep alive.**

The behavior of all combinations of the LED are described in the table below.

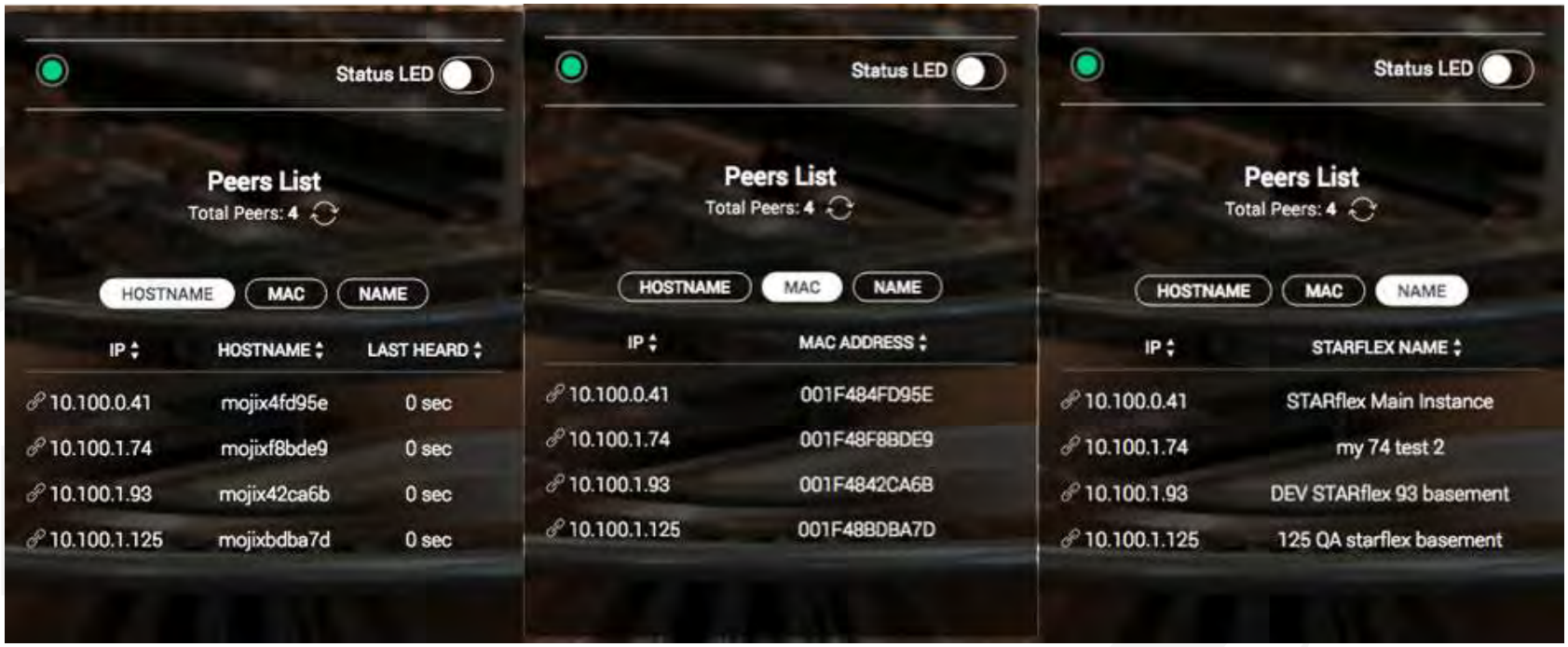
LED Status from API	"Status LED" Switch	LED
ON	**OFF**	Green
OFF	**OFF**	Gray
Blink	**ON**	Green Blinking
Keep Alive	**OFF**	Green flashing every 3 secs



When the user switches the "Status LED" switch to:

ON: the LED will blink (PUT request to config/led/blink in API)
OFF: the LED will flash every 3 secs. (PUT request to config/led/keepAlive in API).

3 buttons to switch between **HOSTNAME**, **MAC** and **NAME** have been added.



Next to Total Peers there is a refresh button . The refresh button sends a broadcast and returns information about all STARflexes that respond.

2.1.4 LOGGING INTO STARFLEX

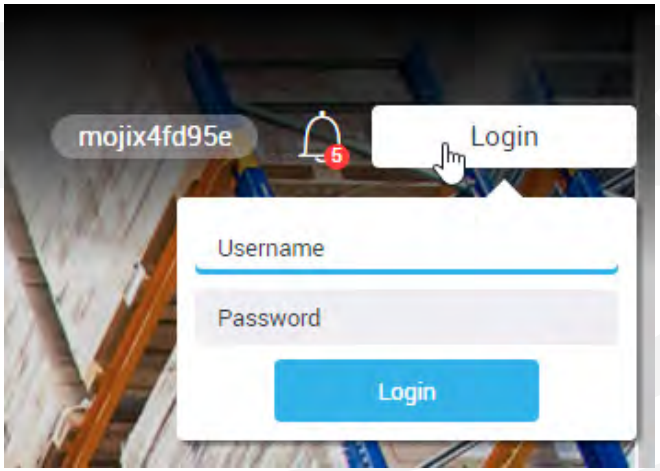
There are two modes to log in to STARflex: Basic Mode and Advanced Mode.

Basic Mode:

Perform the following procedures to log into the STARflex user interface in basic mode:

1. Click on the login button on the top right side.

2. Enter the username in the **Username** field.
3. Enter the password in the **Password** field and click on the Login button or press enter.



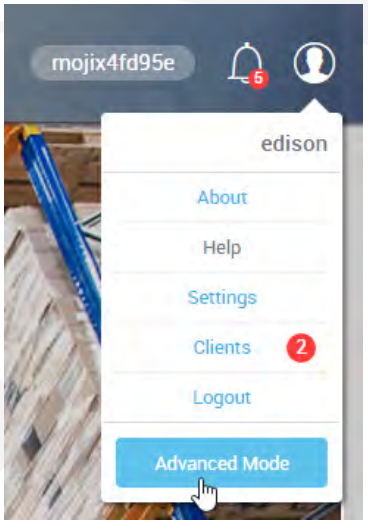
The default credentials for the STARflex UI are provided below:

Username	Password	Security Level
edison	m0j1xInc	Intermediate

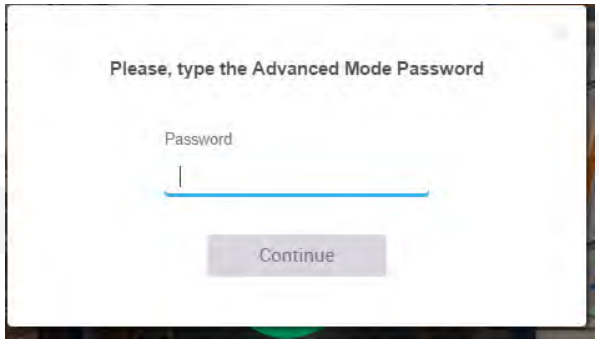
Advanced Mode:

Perform the following procedures to log into the STARflex user interface in advanced mode:

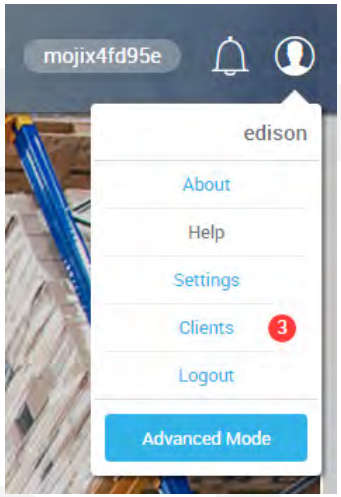
1. Once logged in basic mode click on the User Icon on the top right side and then click on the Advanced Mode button.



2. Enter the password in the Password field and click on the Continue button or press enter.



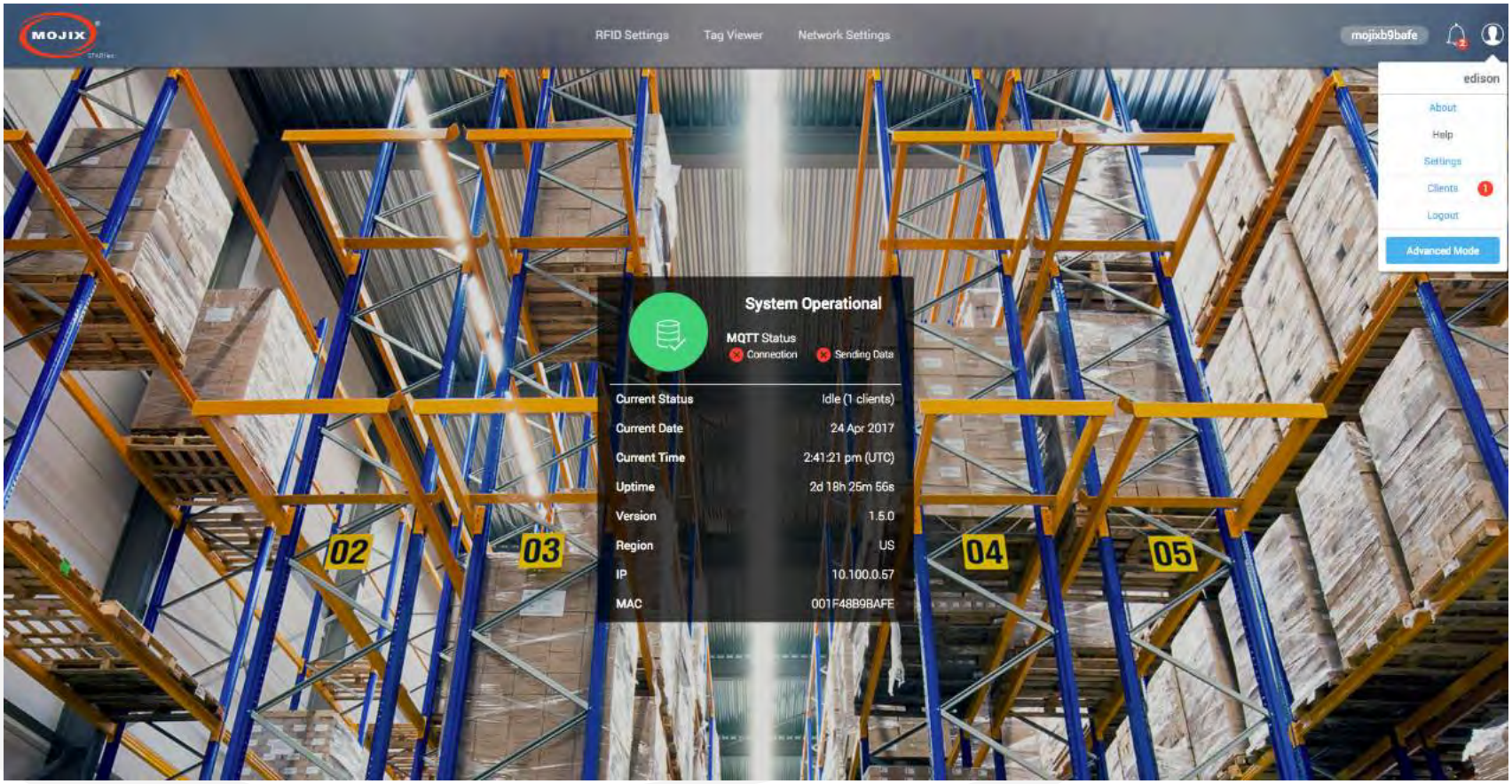
Under the User Icon the following options are available:



These options are detailed below:

2.1.5 ABOUT

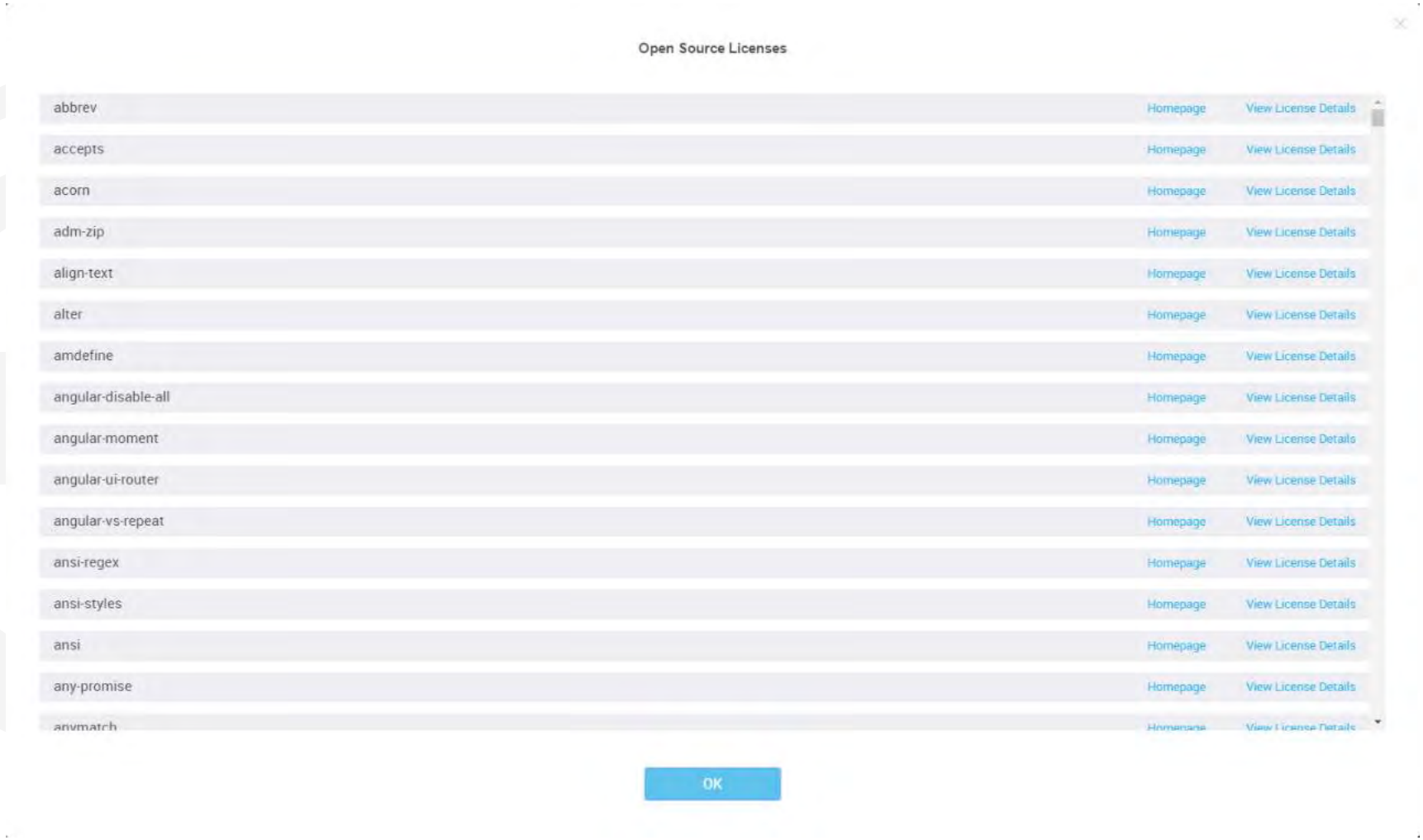
The “About” section is displayed for user logged on at the top right side of the page, clicking on the “user” icon and then in About.



STARflex

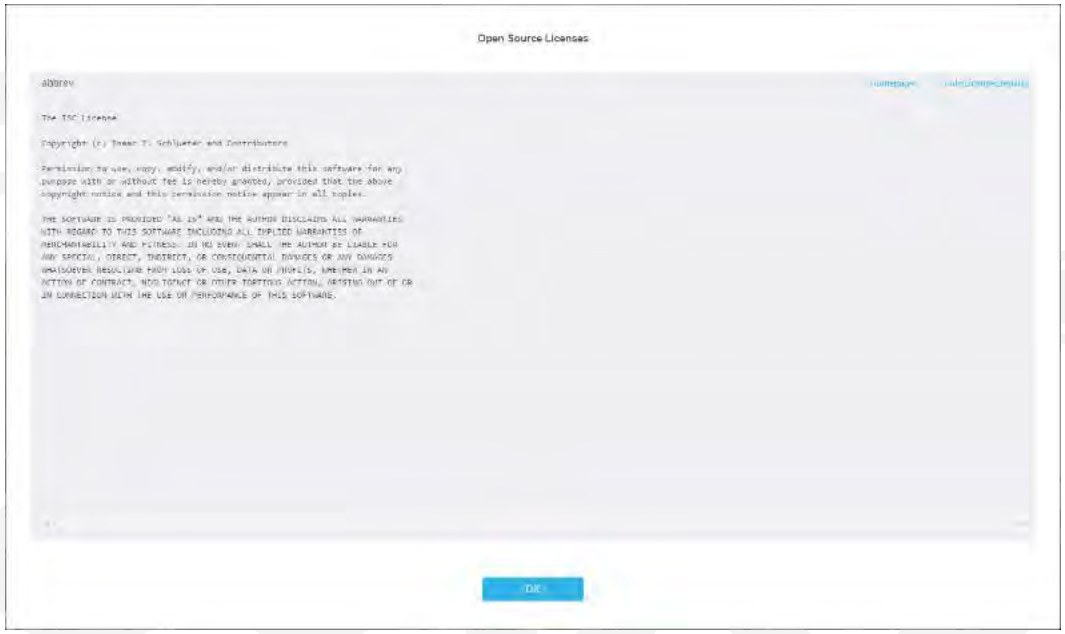
This section shows information about the Version, Firmware version, Build Number, API version, UI version, Boot Loader version and the DSP version of the STARflex.

Click on the Open Source Licenses link to get the list of available licenses. View the content of the different licenses used for the STARflex by clicking on the View License Details link:



Licenses includes a Homepage link such as roboto and droid-sans-mono. Click on the Homepage link and it will redirect to the web page of the font license.

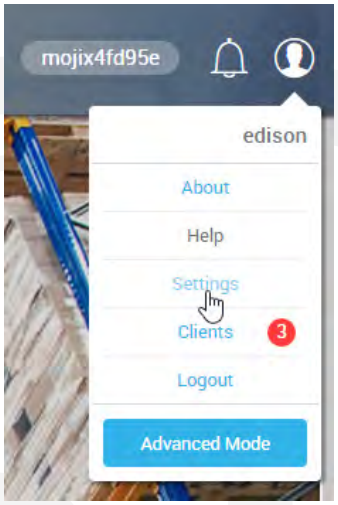
In addition, view the content of the different licenses used for the STARflex by clicking on the View License Details link:



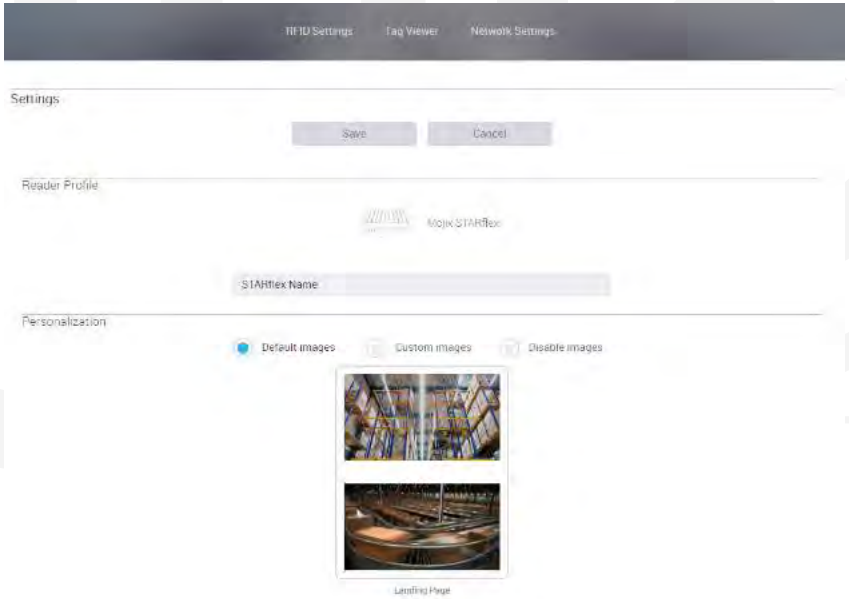
Click on *Hide License Details* to hide the information and return to the License main list.

2.1.6 SETTINGS

The “Settings” option provides the possibility to associate a meaningful name to the STARflex device and to change the landing page background images.

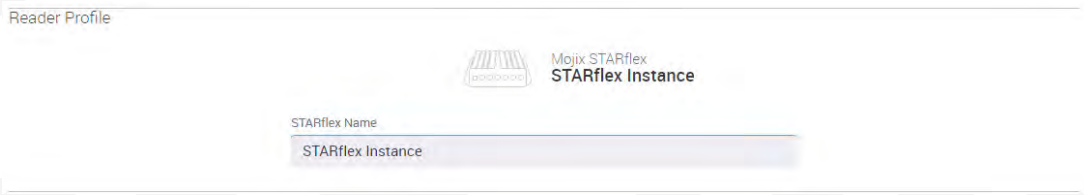


Click over the Settings option and the following configuration will appear:



Reader Profile:

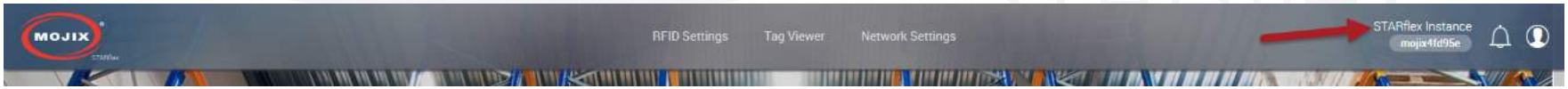
Associate a meaningful name to the STARflex device.



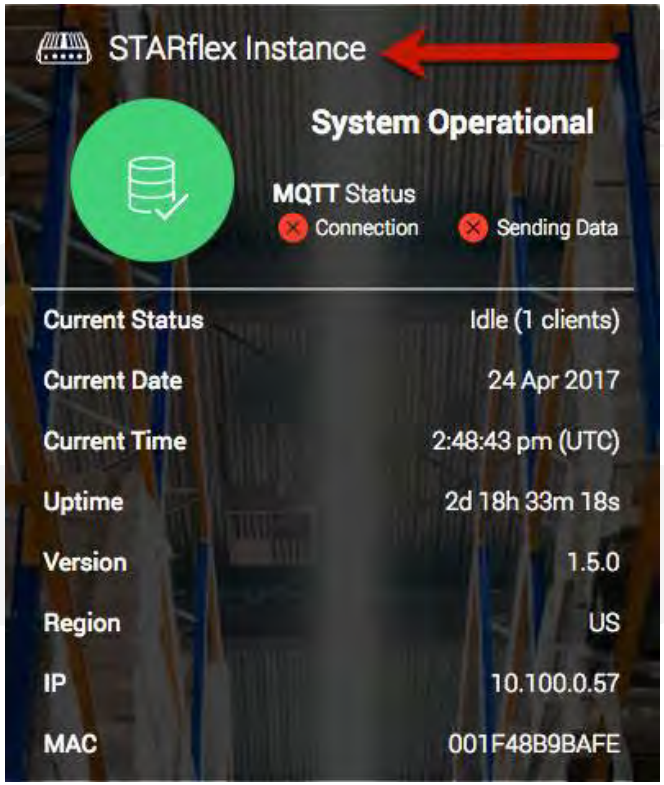
Click on the **Save** button and the label will be changed in the tab browser:

It will also update the label appeared in the following places:

In the landing page above System Operational label:



In the landing page above System Operational section:

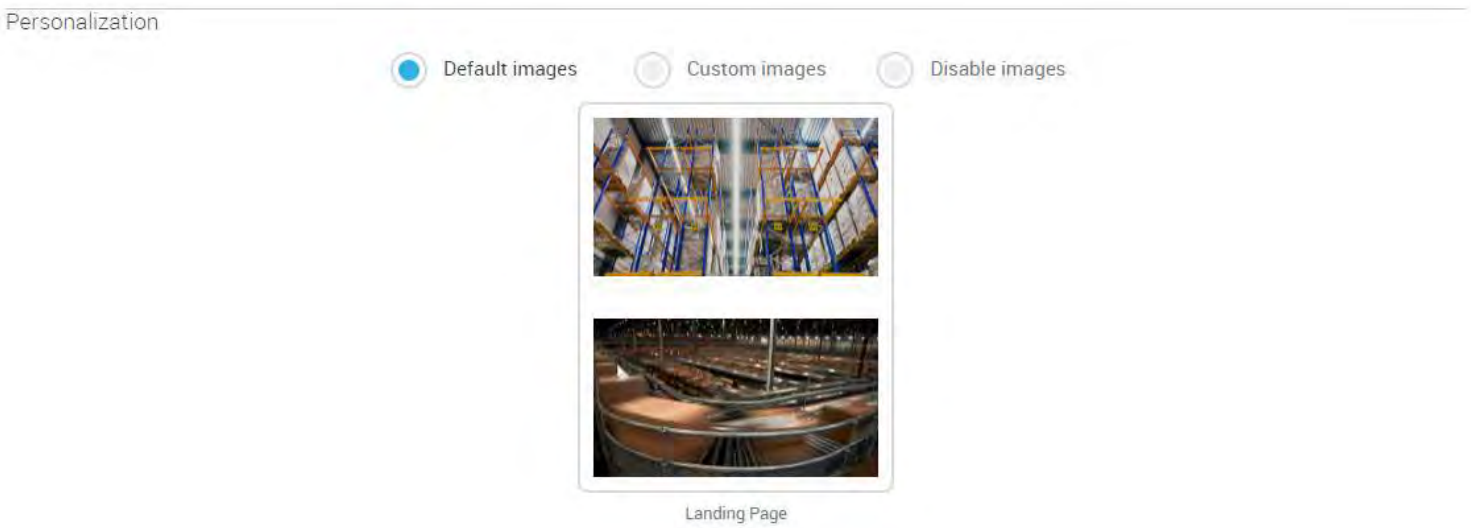


Under the Reader Profile Section:

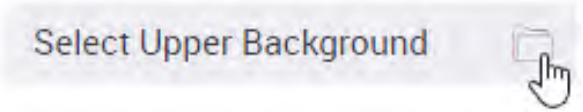
Personalization:

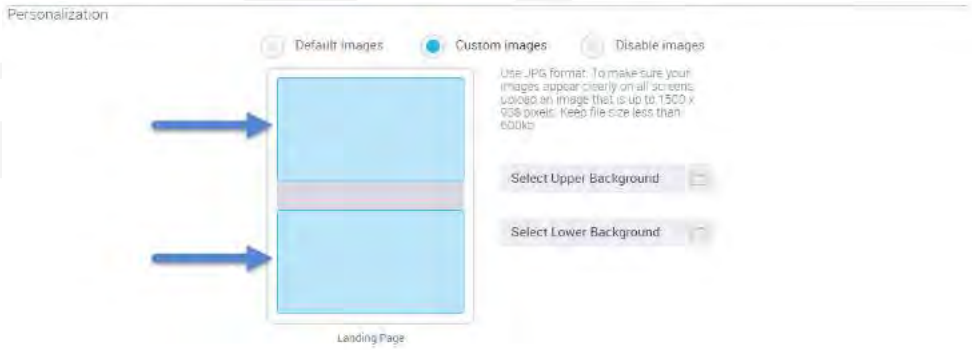
Select the background image the instance will use. The following three options can be selected:

Default images: Select this option to use the default images:



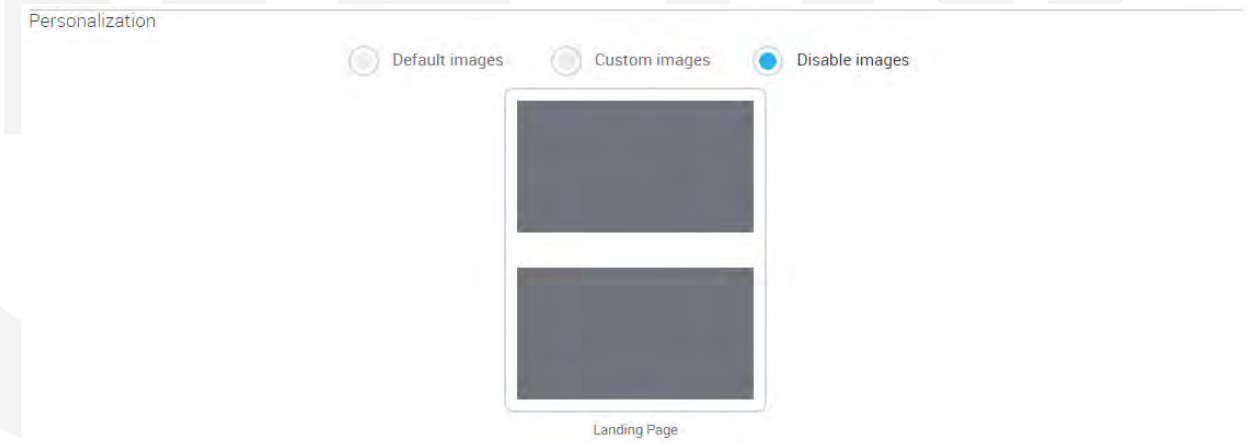
Custom Images: Upload two type of images, one for the upper background and the other one for the lower background. Click on the folder icon or in the select box to search for images in the local computer:



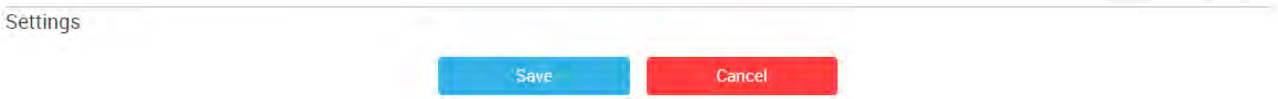


A preview of the image will appear in the upper background area.

Disable images: Select this option if no images are required to be displayed as upper and lower background. A preview of how the background will look like will display:

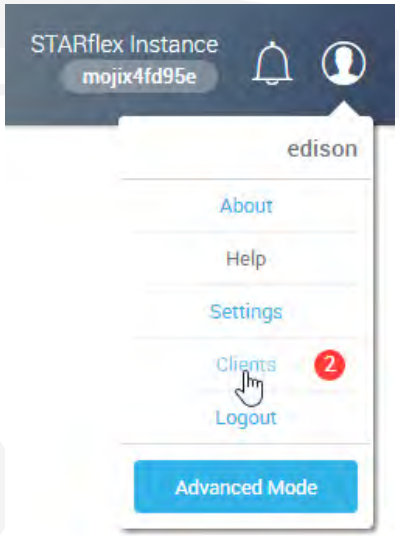


Click on the Save button in order to save changes or click on the **Cancel** button to discard changes.

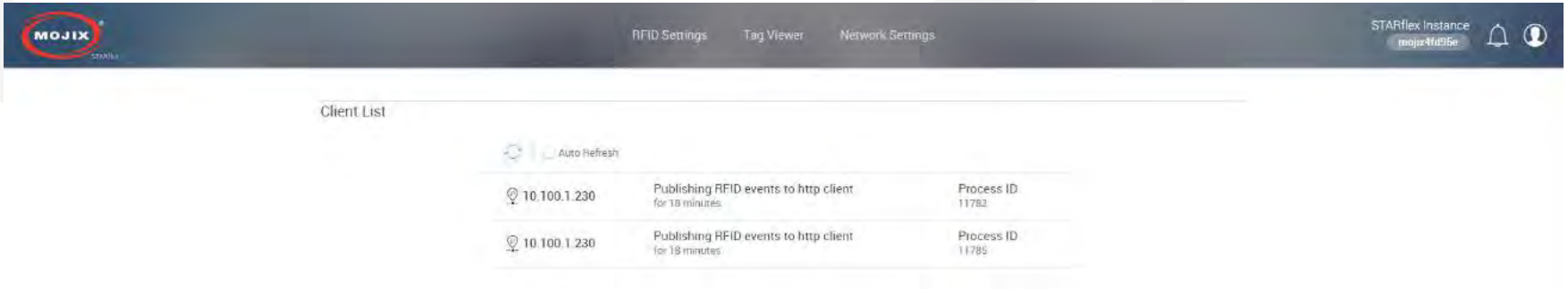


2.1.7 CLIENT LIST

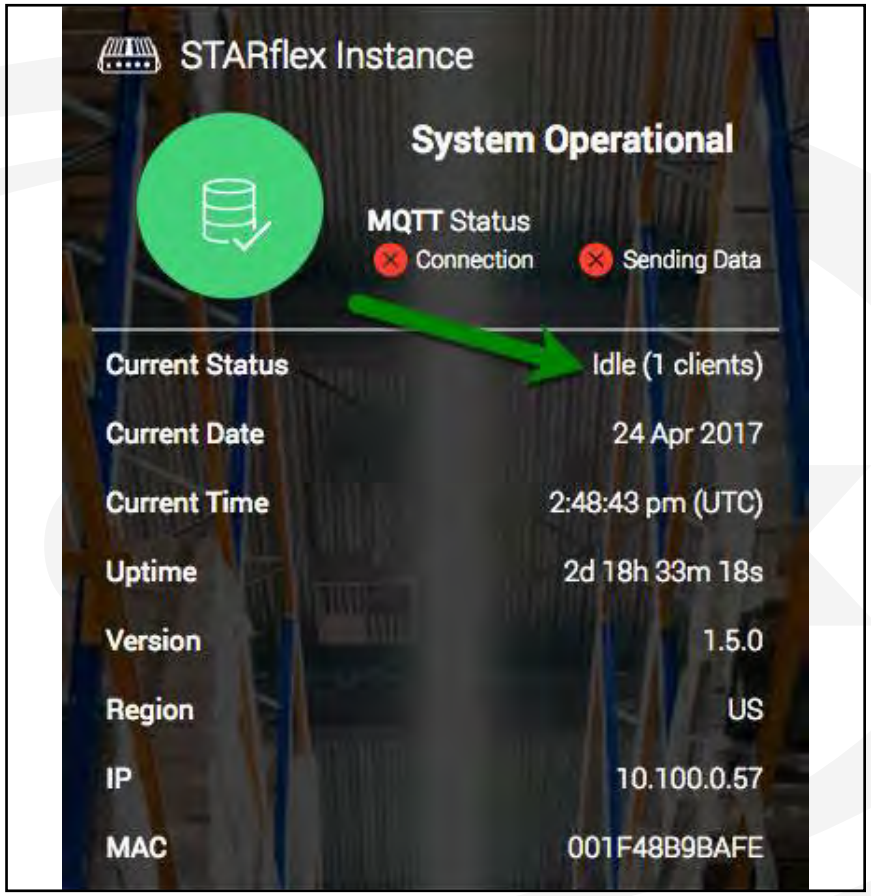
The client list page displays the information of every client that is connected to the STARflex. The number of available clients will be displayed inside the user profile menu:



The client list page displays the information of every client who is connected to the STARflex. It includes the IP address, the length of time and the Process ID of each client. STARflex has a maximum number of five clients (4 http and 1 MQTT).



The number of clients can also be checked in the Landing Page under the *System Operational* section:

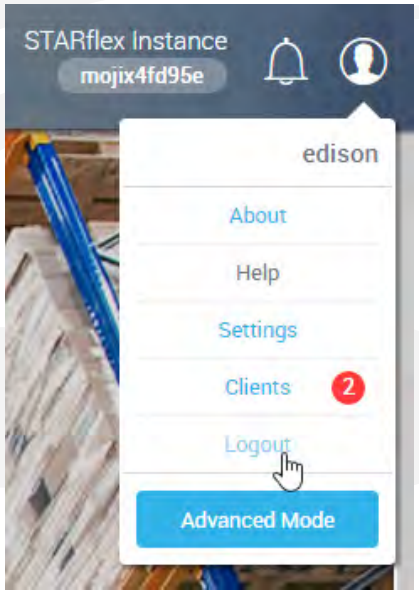


2.1.8 LOGGING OUT OF STARFLEX

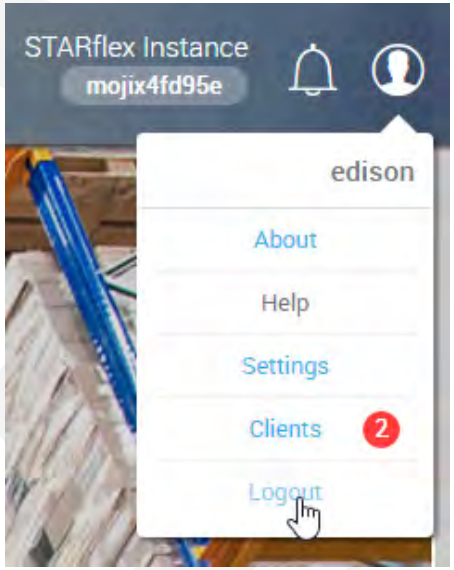
Logging out allows you to exit the current STARflex session. Perform the following procedures to log out of the STARflex user interface:

1. Click on the Logout link displayed once the User Icon is clicked on the top right side.

From the Basic Mode:



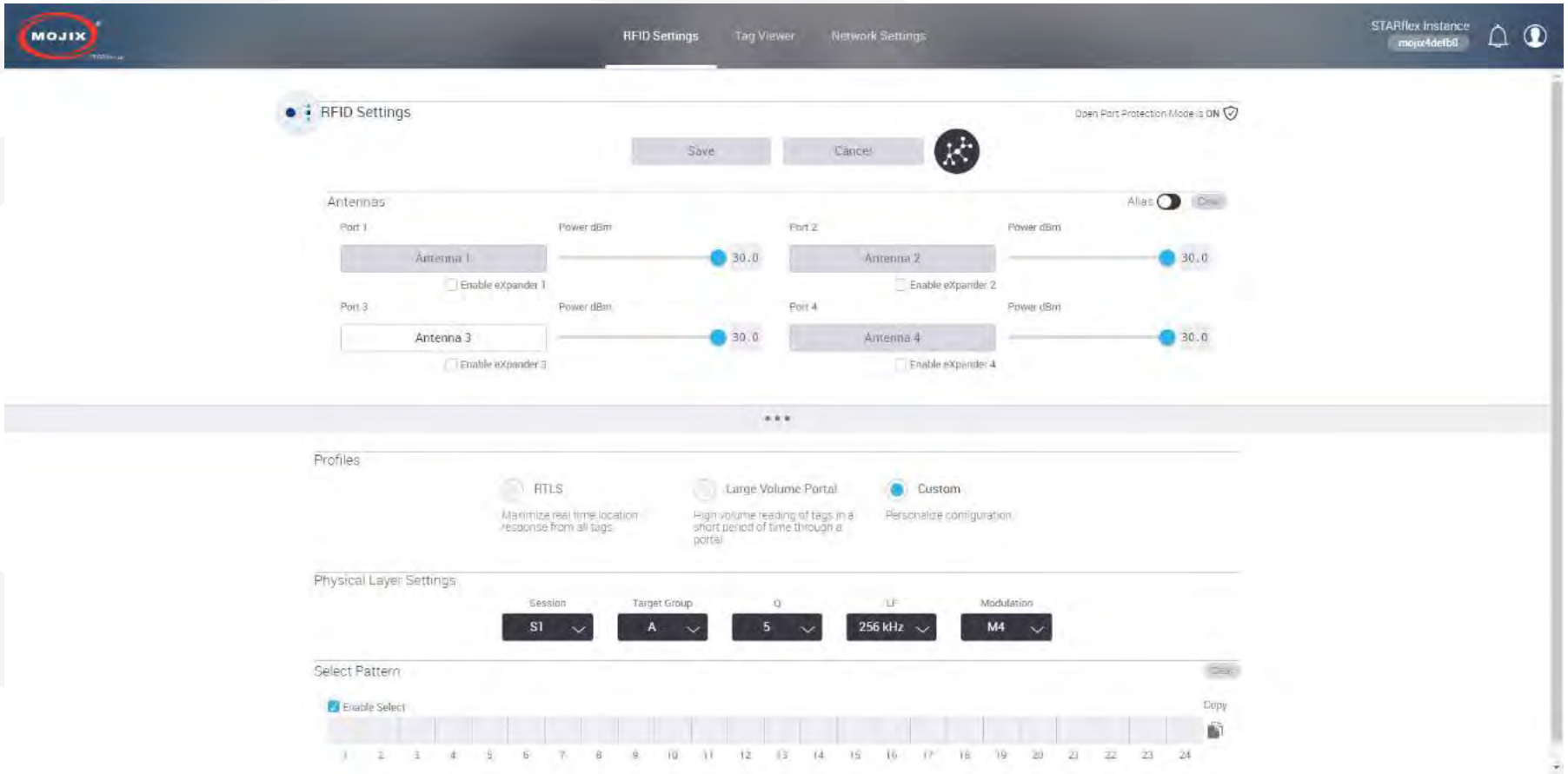
From the Advanced Mode:



2.1.9 BASIC MODE

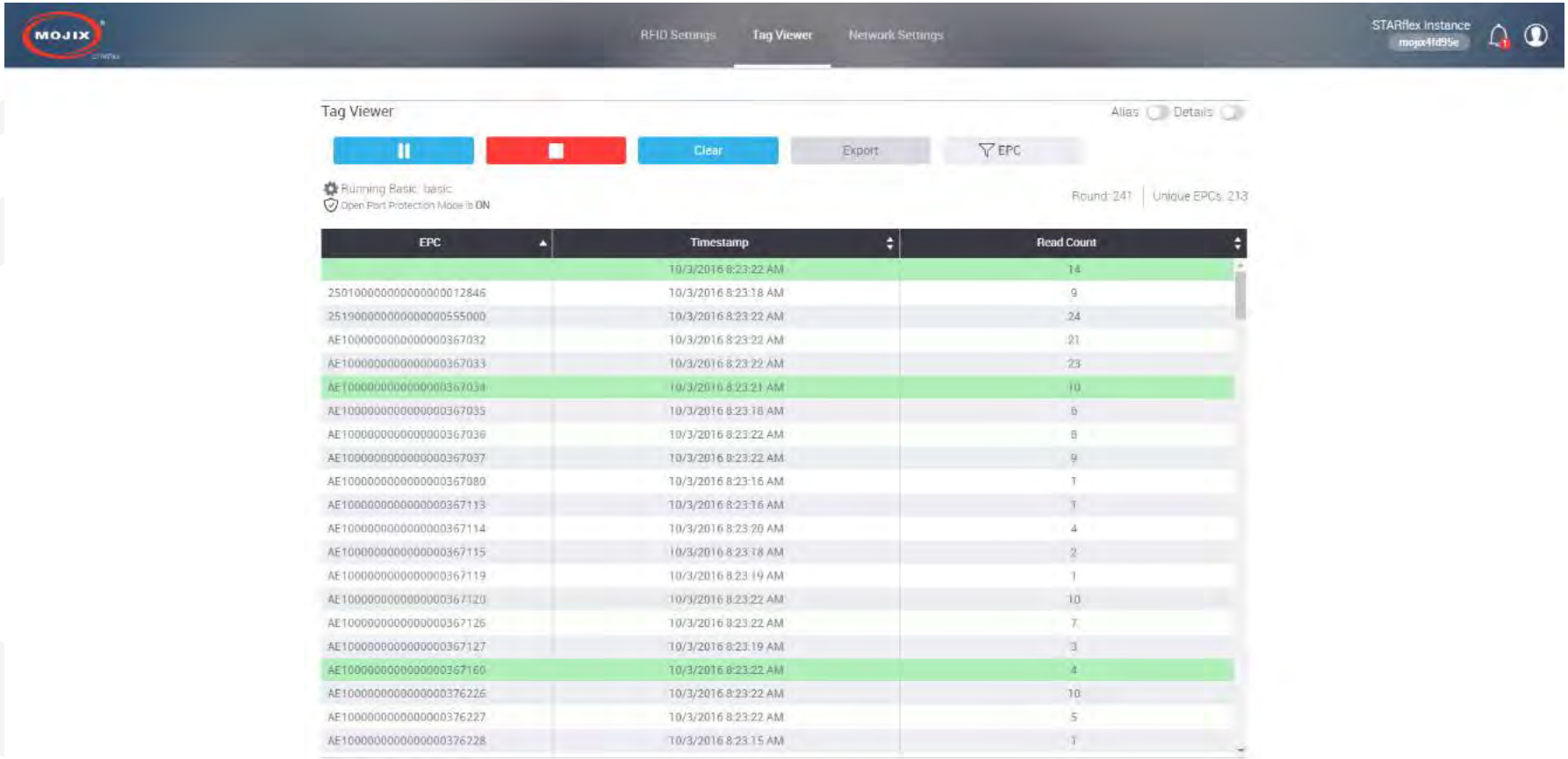
RFID Settings

The RFID settings section allows the user to view and configure different Antennas that are associated to the STARflex. These selections include antenna, port, eNode antennas, physical layer settings and patterns. For detailed information please refer to Chapter III RFID Settings.



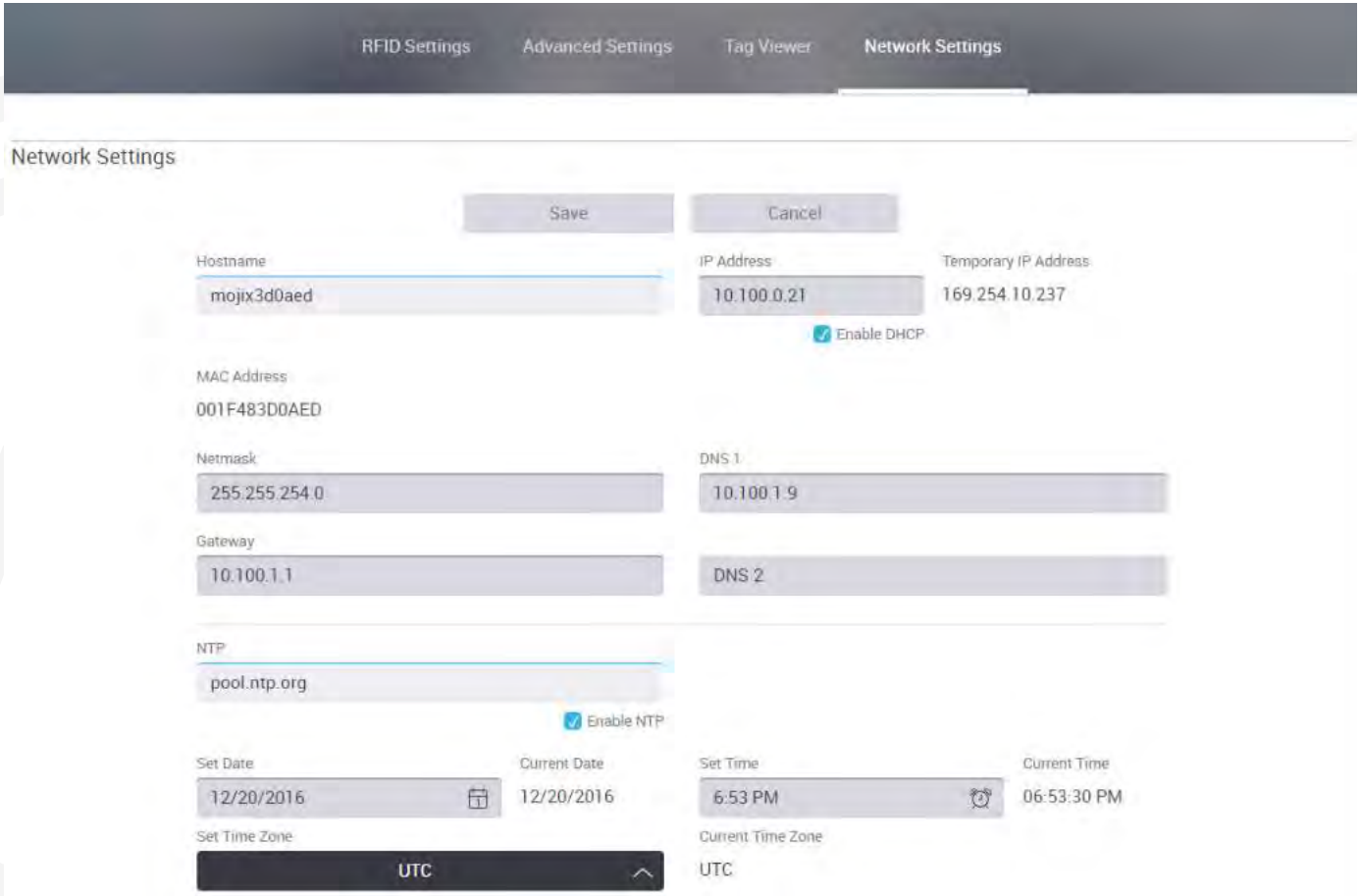
Tag Viewer

The tag viewer section allows the user to quickly select and turn on antennas in order to find and read tags, displaying all the found tags in a list. In addition, it is possible to filter while live reading the EPCs, TxID (transmit antenna) and export the list in a CSV file. For detailed information please refer to Chapter IV Tag Viewer.



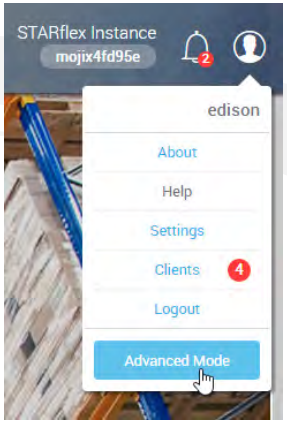
Network Settings

The network settings section describes a set of fields to configure the network that the STARflex will use. For detailed information please refer to Chapter V Network Settings.

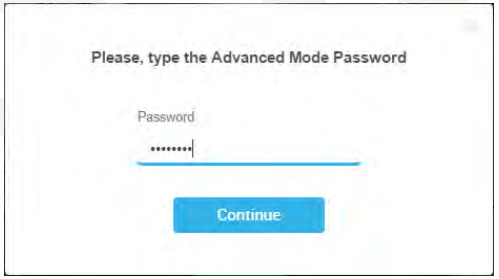


2.1.10 ADVANCED MODE

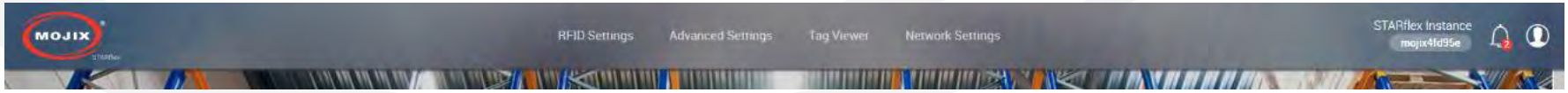
Access to the Advanced Mode by selecting the option, then click on the Advanced Mode button:



Introduce the password to have access to the Advanced Mode:



Inside the Advance Mode, the following tabs are available:

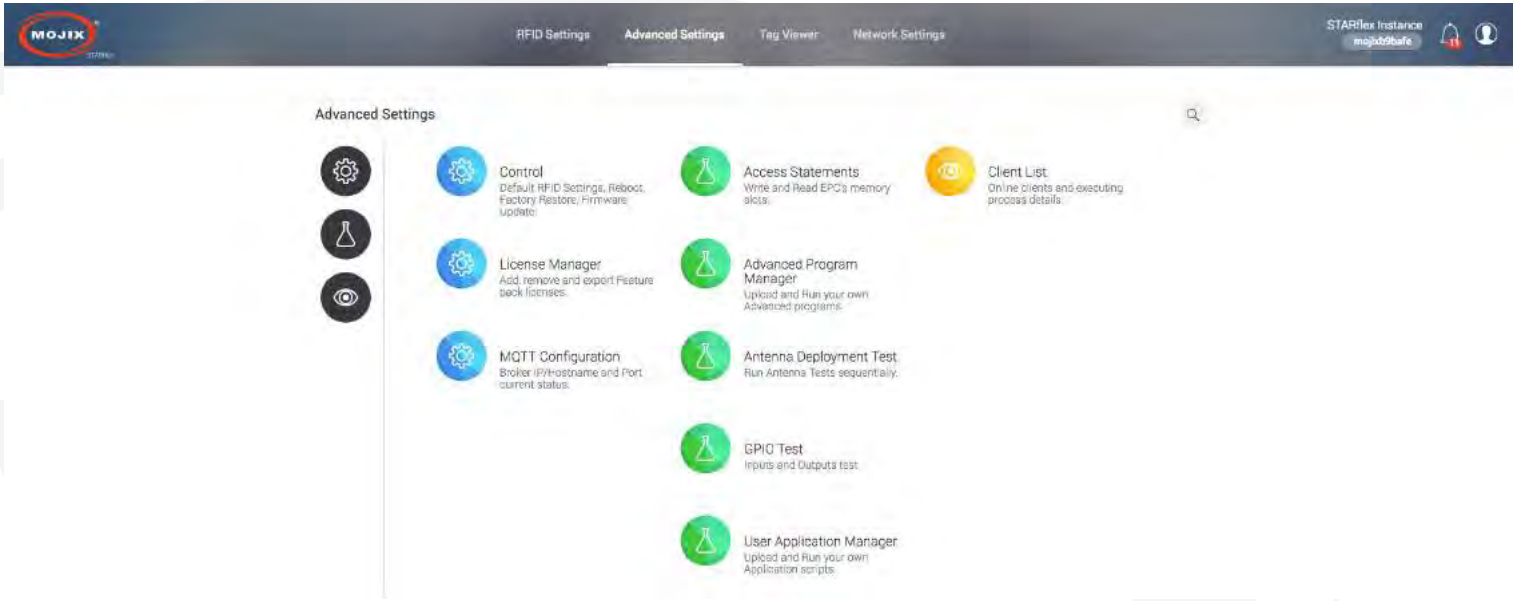


For detailed information of each one of the tabs, refer to Chapter III - RFID Settings, Chapter IV - Tag Viewer and Chapter V - Network Settings

Advanced Settings

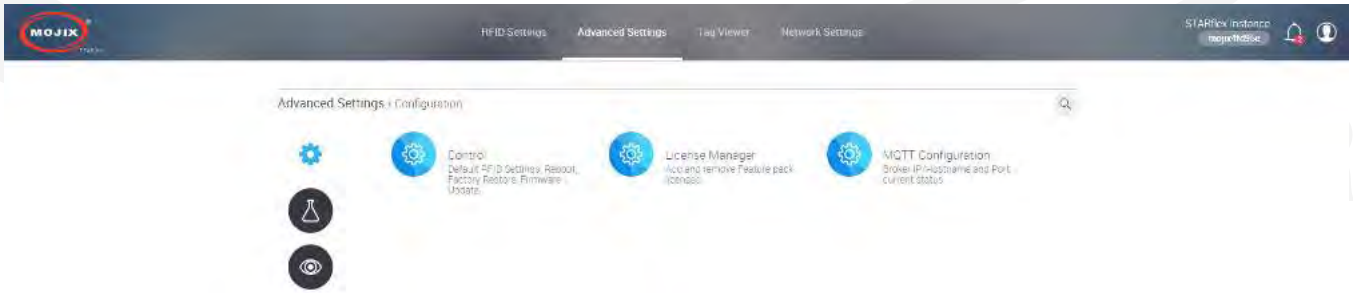
The Advanced Settings tab includes the following configuration options:

At the right side of the screen options are grouped by color depending on their functionality:

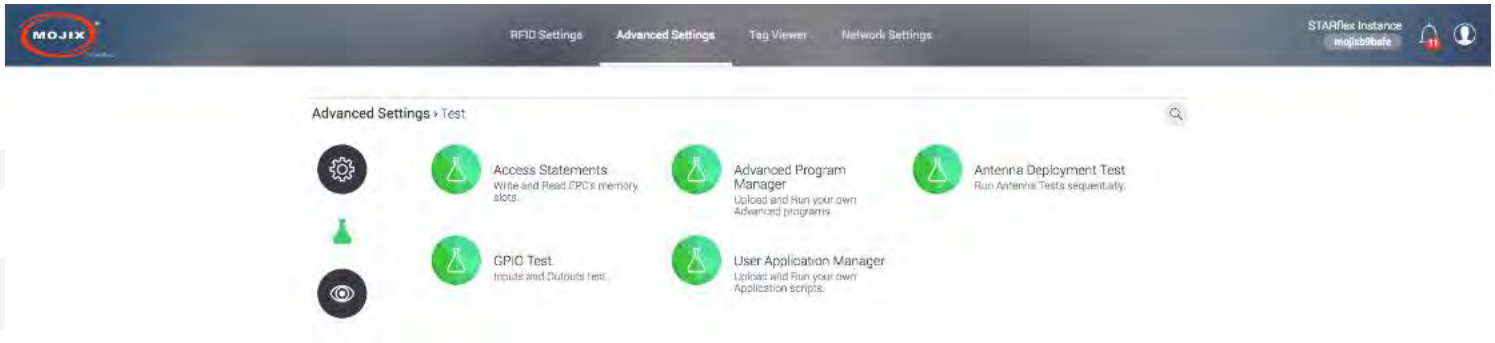


While at the left side, 3 filters for each one of the groups are displayed:

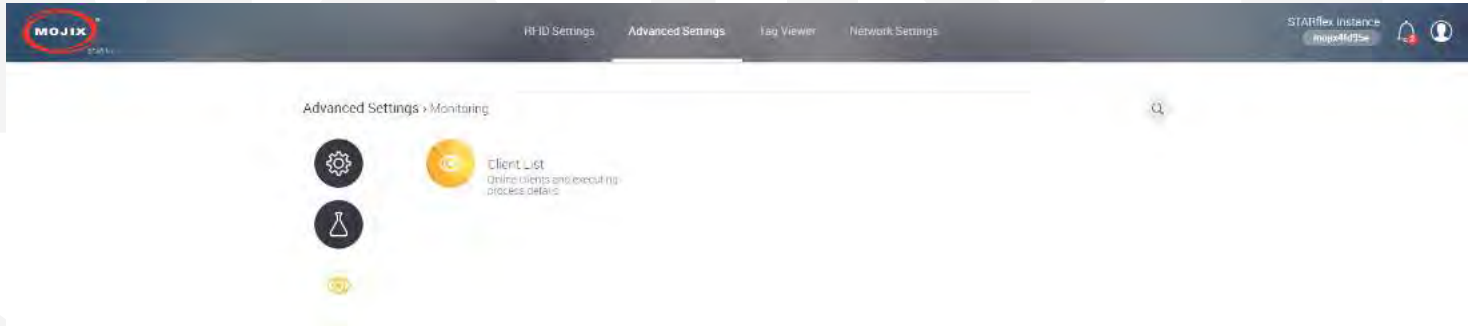
Configuration:



Test:



Monitoring:



- Mouse over to highlight the option:

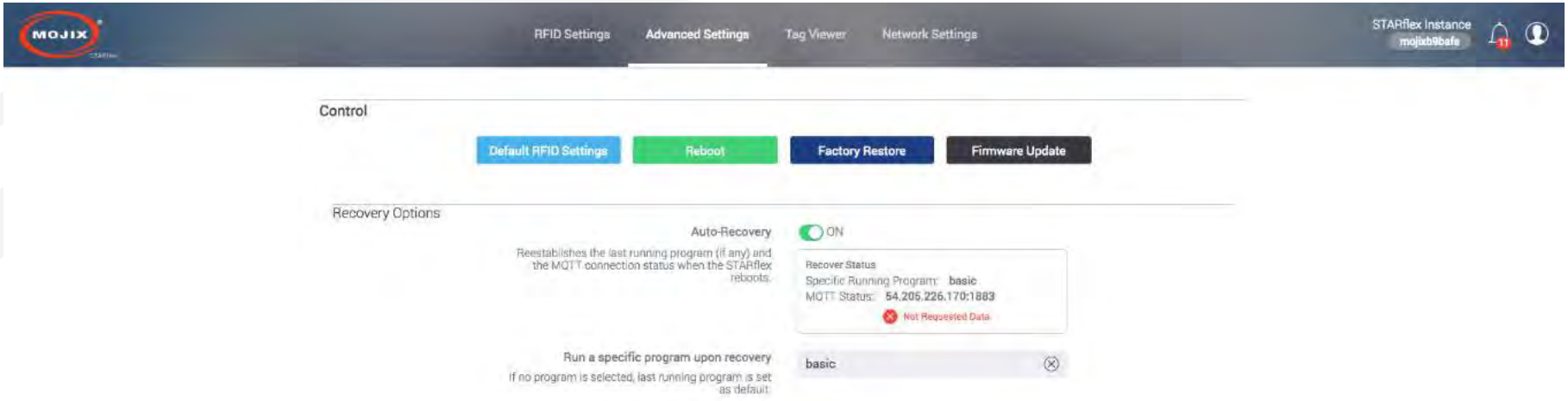
- Search for specific options by using the search option. Click on the to expand the search bar:

Introduce some text inside the text field and it will automatically highlight the text found among the different options:

If no text is introduced in the text field, by default all options will be listed.

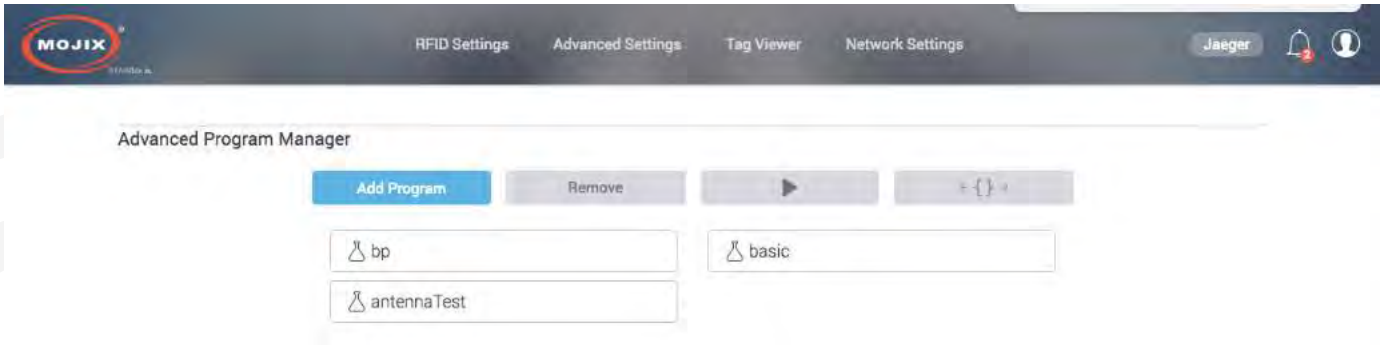
Control

The Control section describes four available options, Default RFID Settings (reset all RFID settings), Reboot, Factory Restore (restore to the original configuration) and Firmware Update. For detailed information please refer to Chapter VI - Control.

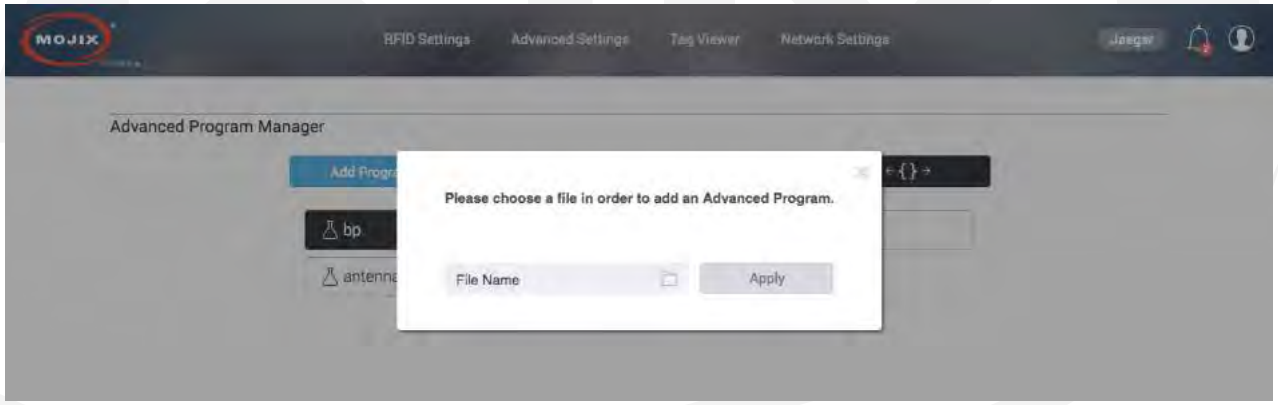


Advanced Program Manager

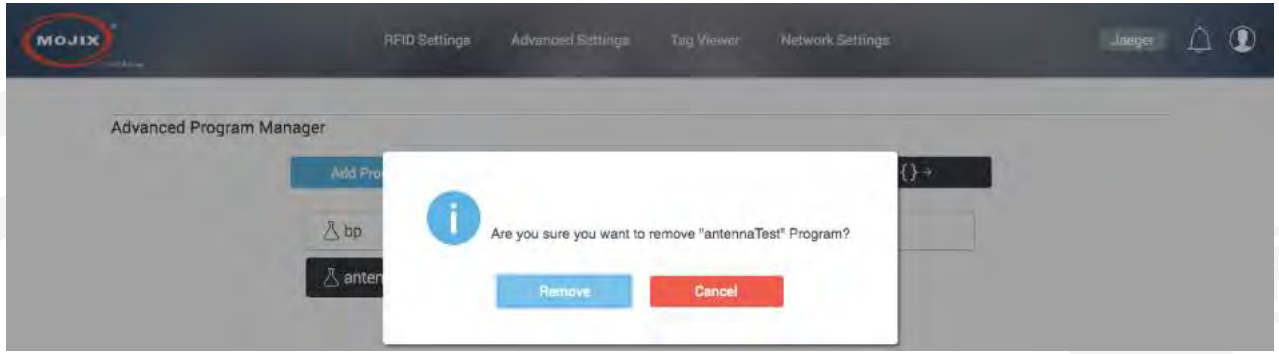
The “Advanced Program Manager” page allows the user to upload, remove, run and modify Advanced RFID Programs on the STARflex.



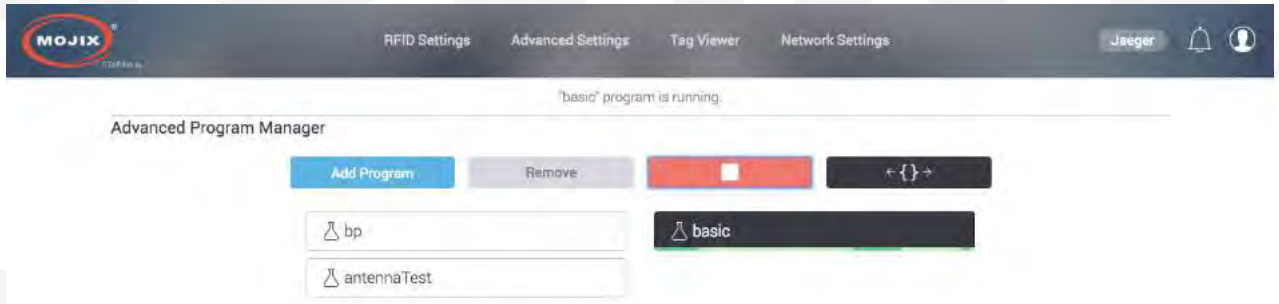
To add a new program click on the “Add Program” button, a message will appear, select the program to be uploaded and click on



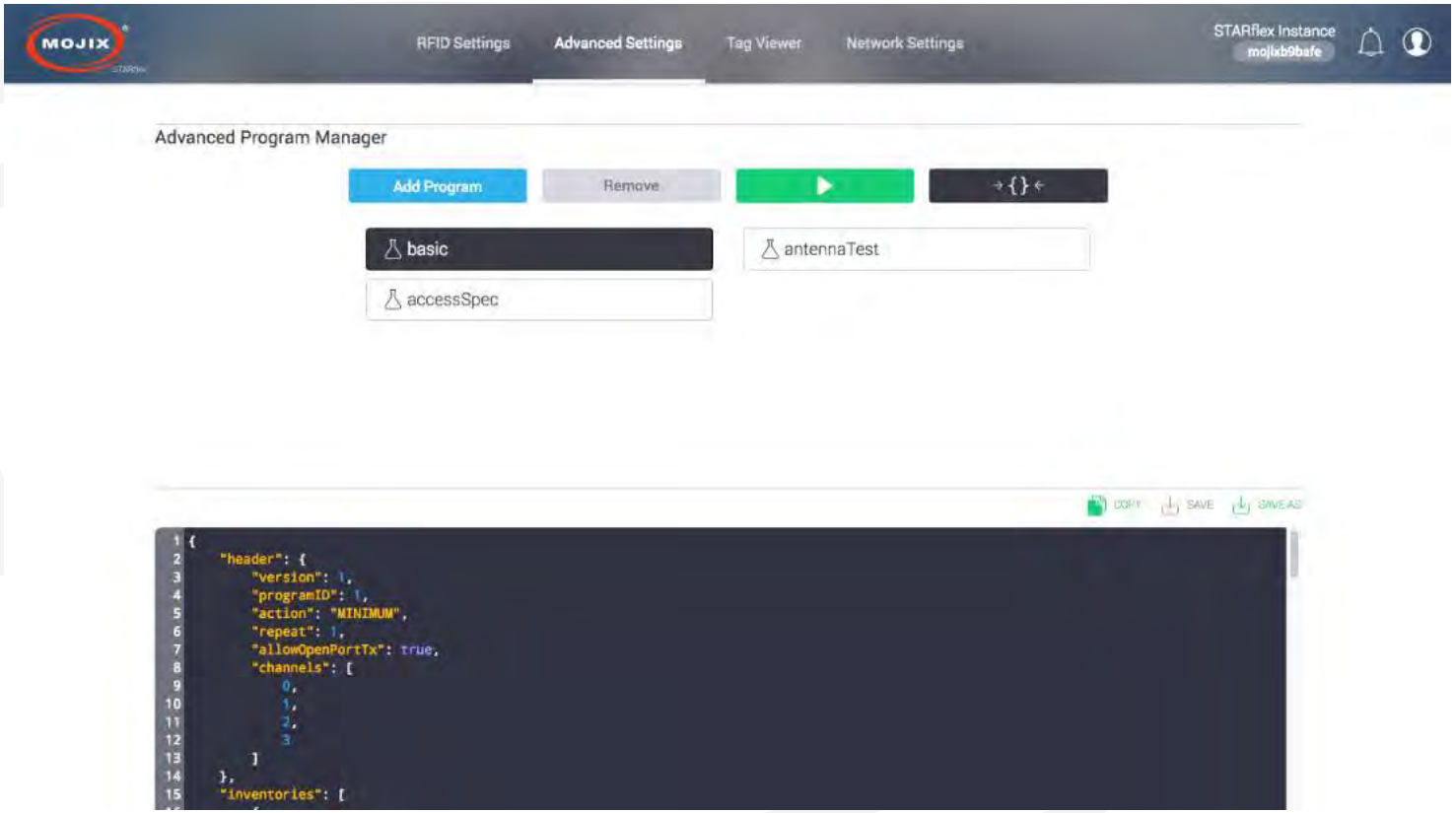
To delete an existing Advanced Program select the one to be removed, then press on the “Remove” icon, a prompt message will appear, click on “Remove”.



To run a program select the program and click on the “Play” icon.

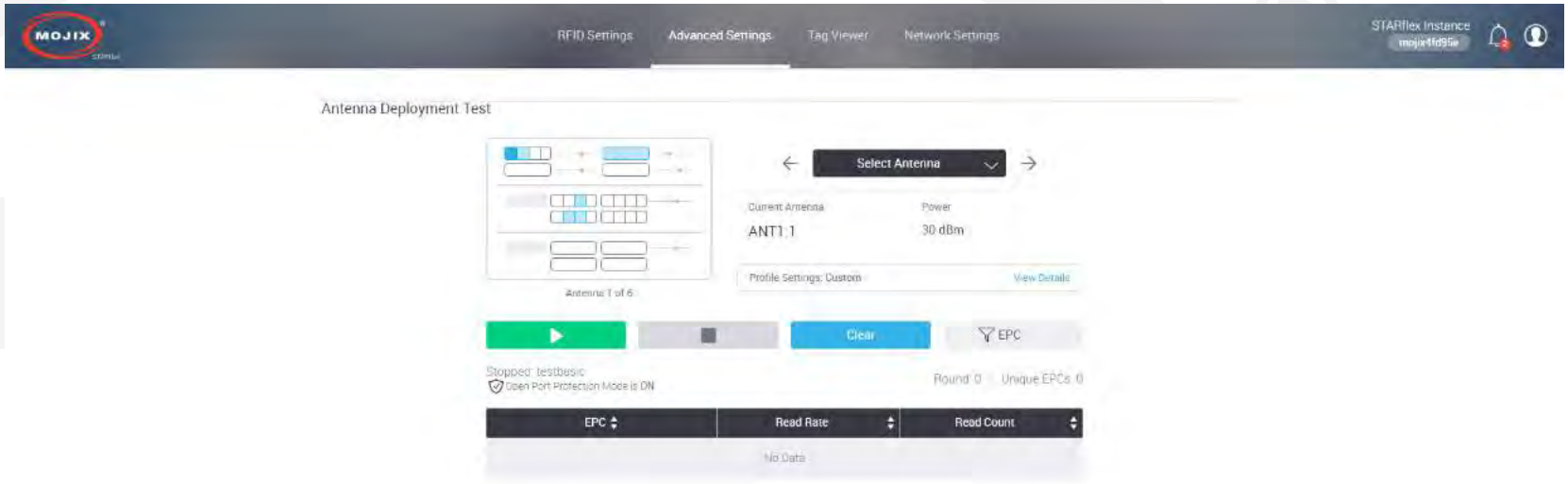


To view or modify the content of the RFID program click over the brackets button. To copy the content click over the “Copy” icon. To save any changes made to the RFID program click on the “Save” button or click on the “Save As” button to change the name.



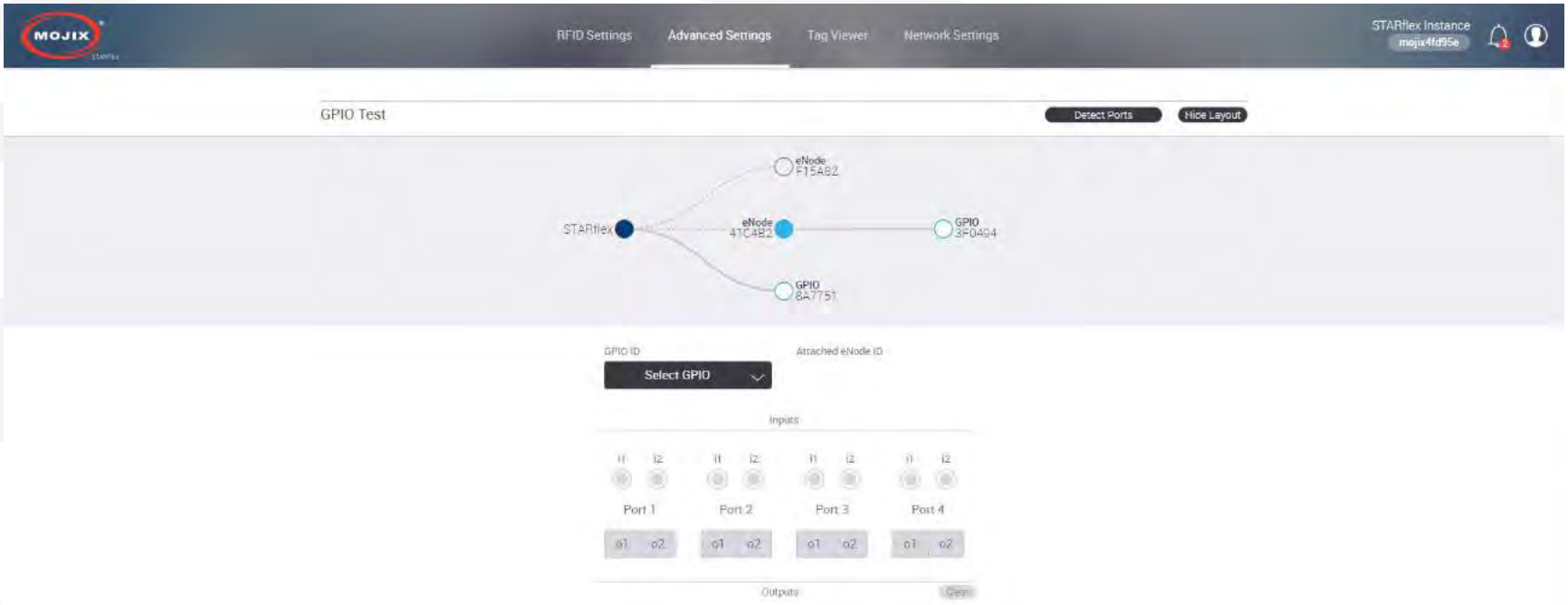
Antenna Test

The “Antenna Deployment Test” page allows the user to step through the configured antennas in the basic settings page (refer to Chapter III - RFID Settings) in order to test them one by one and make sure they each can read tags. This process ensures proper continuity of cables and antennas. For detailed information please refer to Chapter VI - Antenna Test.



GPIO Test

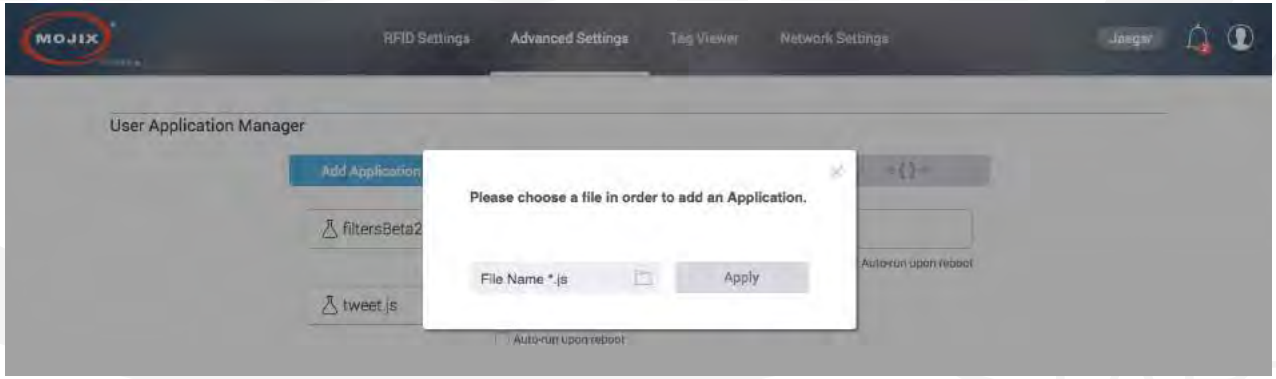
The “GPIO Test” page allows the user to validate the state of connected input devices and to test output devices by triggering the respective output through the interface. For detailed information please refer to Chapter VI - GPIO Test.



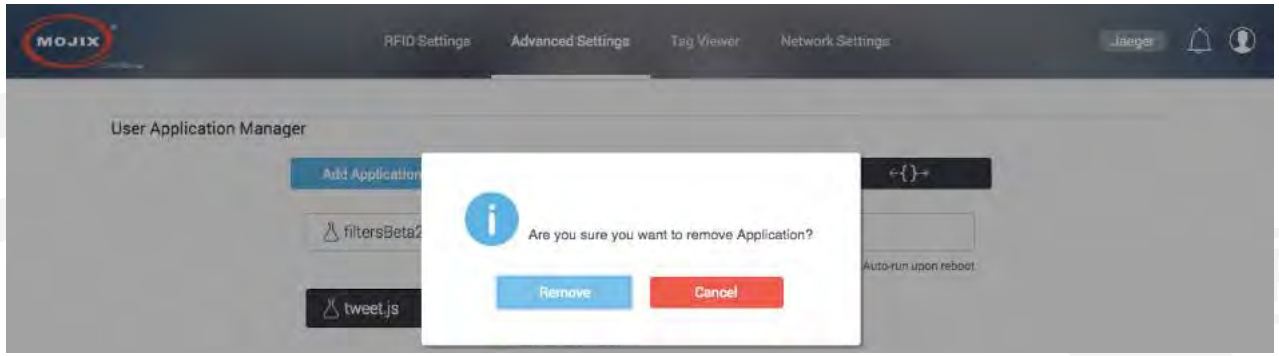
User Application Manager

The “User Application Manager” page allows the user to upload, remove, run and modify User’s own applications created in JavaScript for the STARflex.

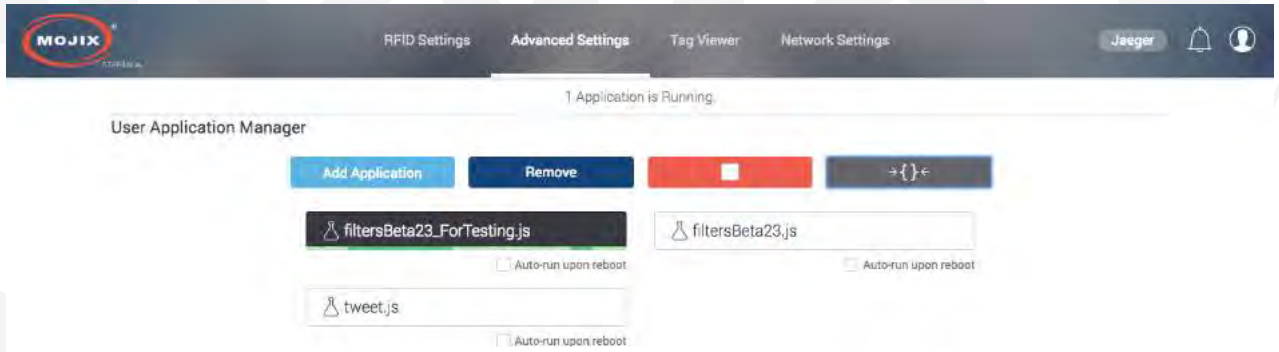
To add a new application click on the “Add Application” button, a message will appear, select the program to be uploaded and click on “Apply”.



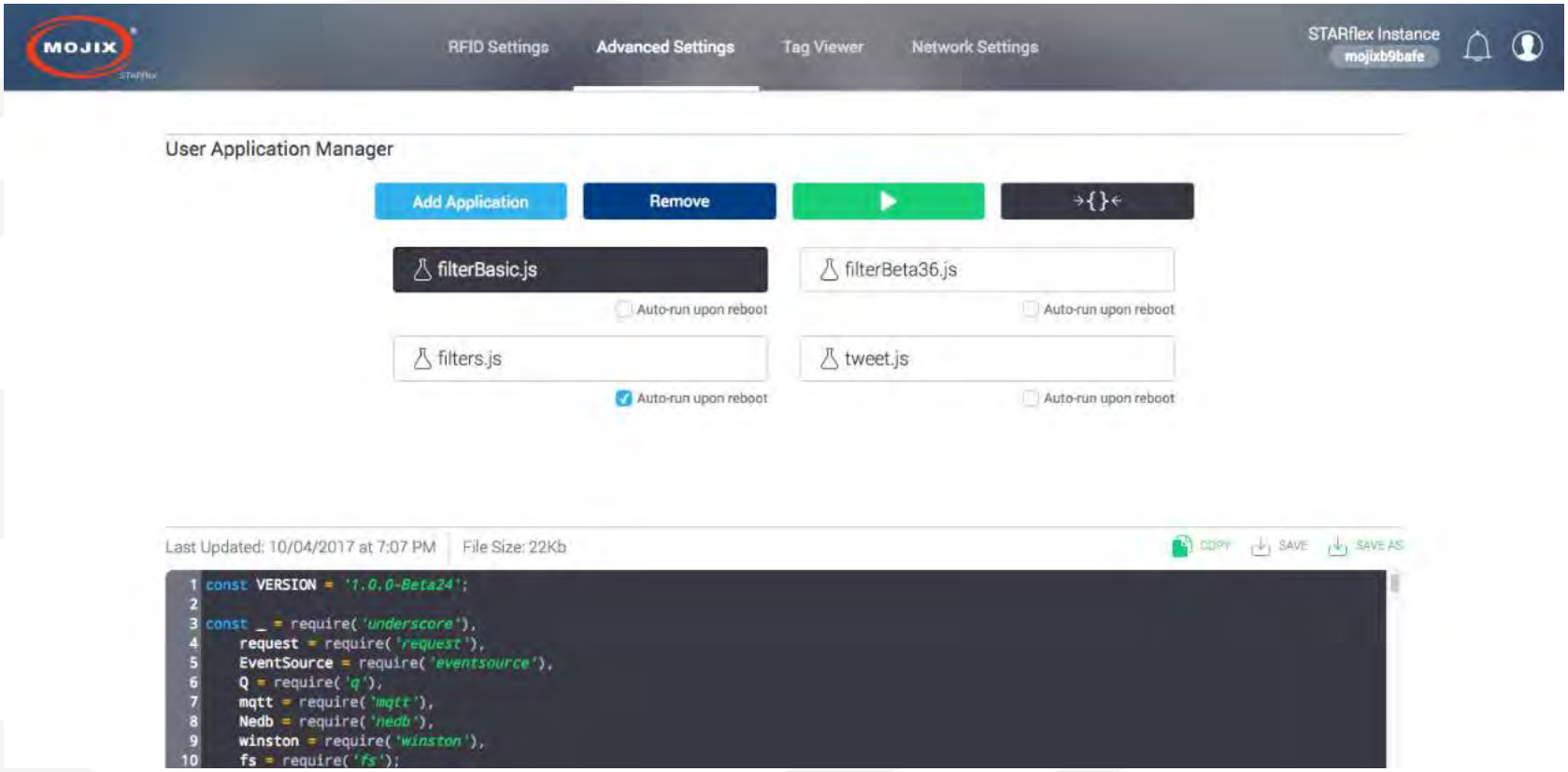
To delete an existing Application select the one to be removed, then press on the “Remove” icon, a prompt message will appear, click on “Remove”.



To run an application select the program and click on the “Play” icon.



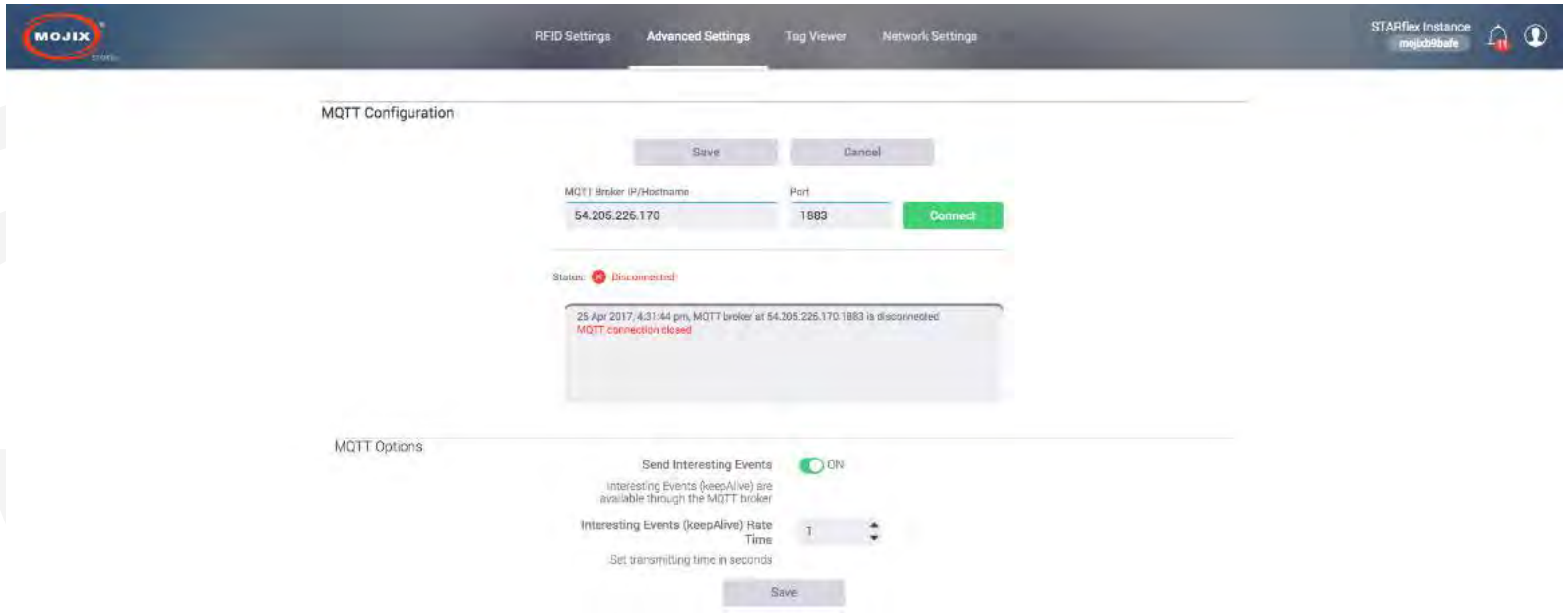
To view or modify the content of an application click over the brackets button. To copy the content click over the “Copy” icon. To save any changes made to the application click on the “Save” button or click on the “Save As” button to change the name.



Note: *Due to factory configuration it is not possible to upload JS applications on IOS devices.*

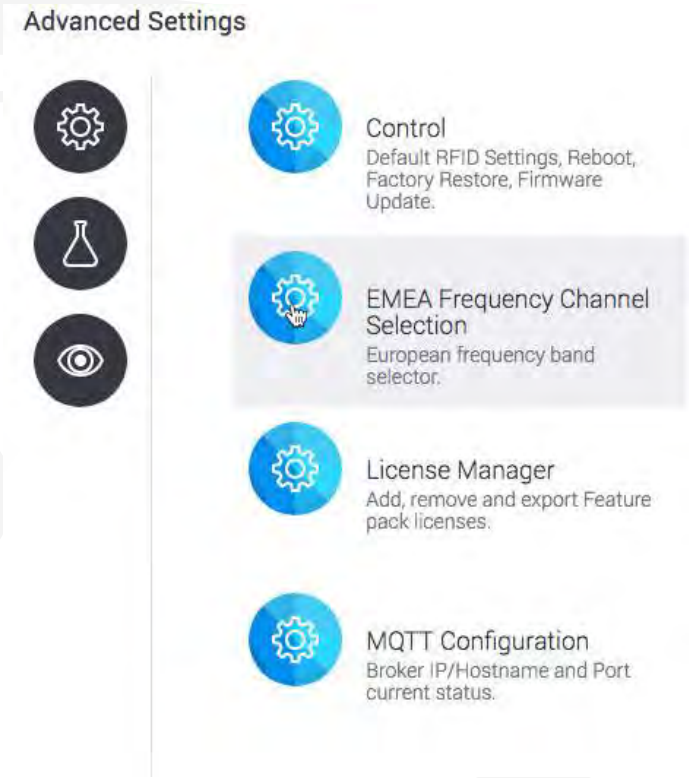
MQTT Configuration

The “MQTT Configuration” page allows the user to set up the hostname/IP address, port of the MQTT broker to be used by the STARflex, as well as configure the Interesting Events Keep Alive. For detailed information please refer to Chapter VI - MQTT Configuration.



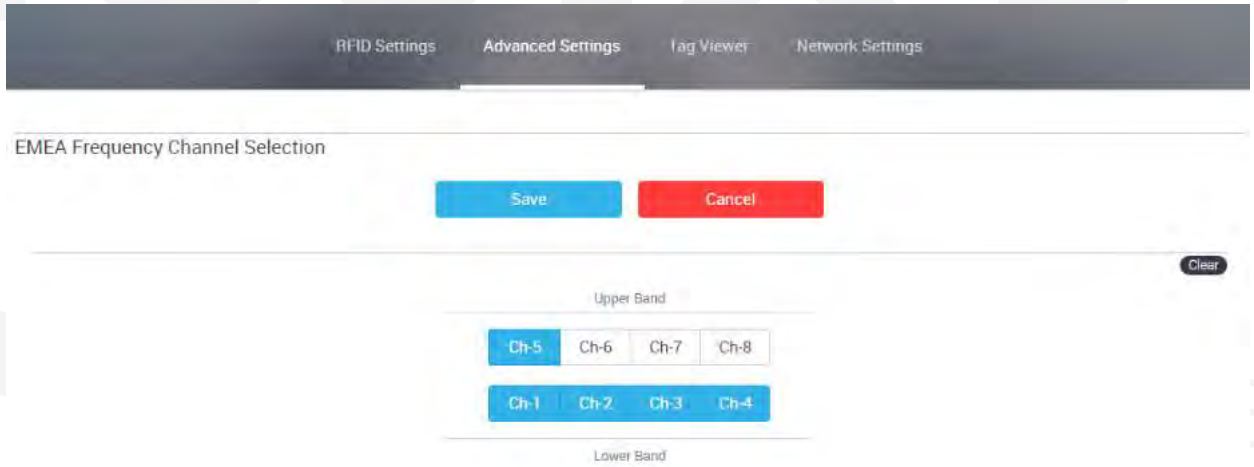
Frequency Channel

The frequency channel interface shows the available channels to be used. This option is available only for European Customers. Only low band channels are all selected by default.



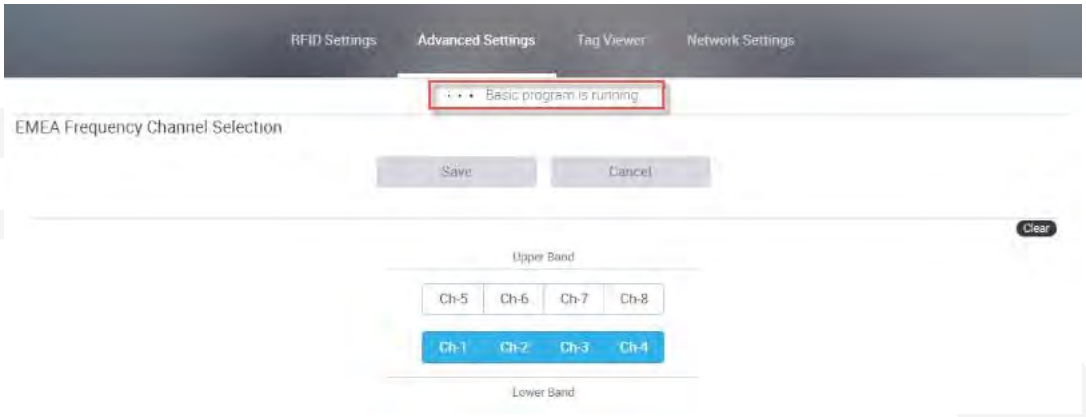
Important*: The usage of Upper Band Channels is forbidden in some countries, please check your country regulation.*

If the configuration is changed, the Save and Cancel button will be enabled:



Note: *If all channels are disabled a warning message will appear and lower band channels will be selected by default.*

When a Basic program is running there will be a message on the top showing the Basic Program is running:



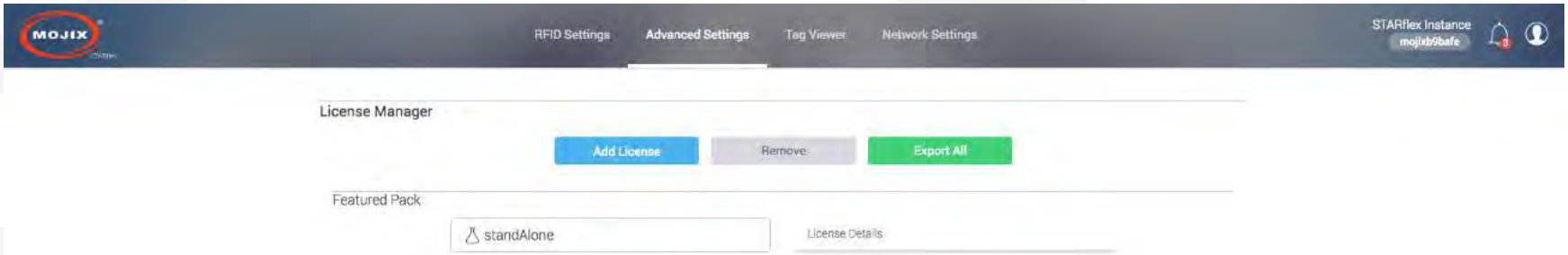
See this section for more information about running the Basic Program

When an Advanced program is running the Frequency Channel displays information of the configured channels

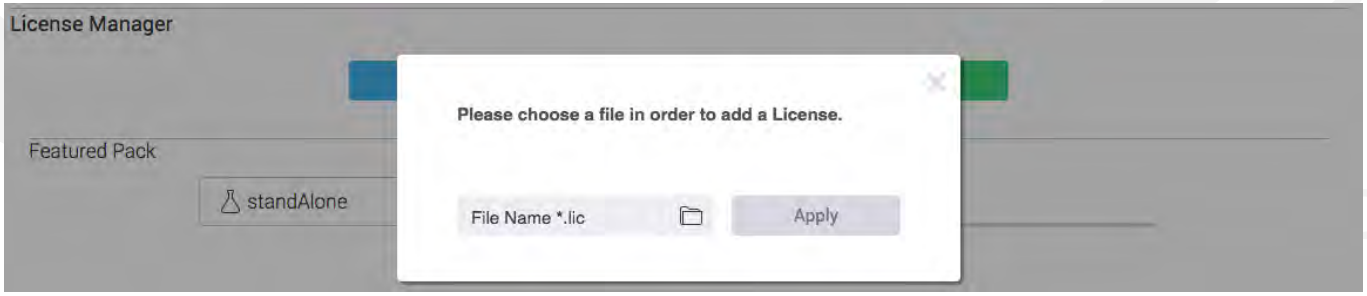
Channel selection for a running advanced program is read only, while the Basic program's buttons can be changed.

License Manager

The “License Manager” page allows the users to upload and add or remove licenses to the STARflex. For detailed information please refer to Chapter VI - License Manager.



To upload a license, click on the Add License button:



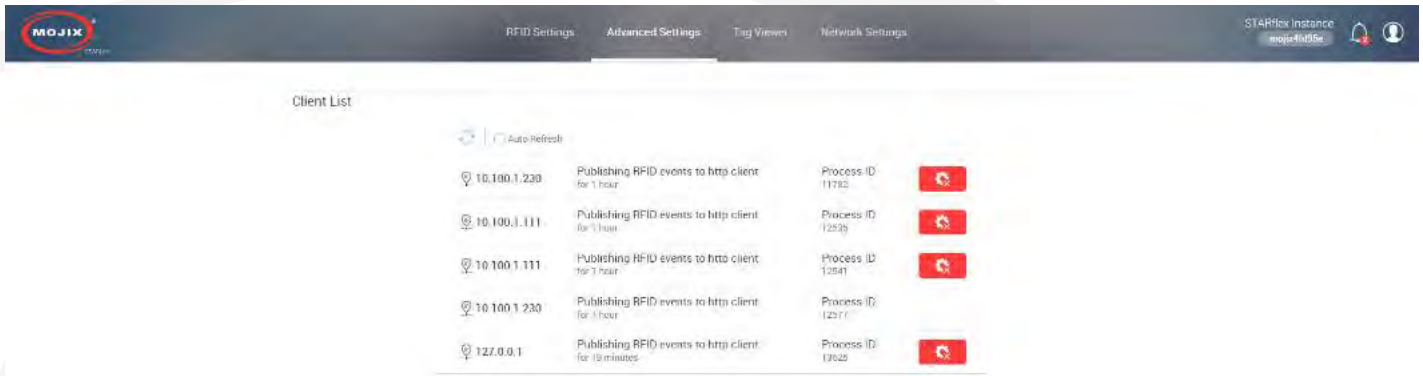
To remove a license click on the Remove button. Note that the STARflex must be rebooted.

Client List

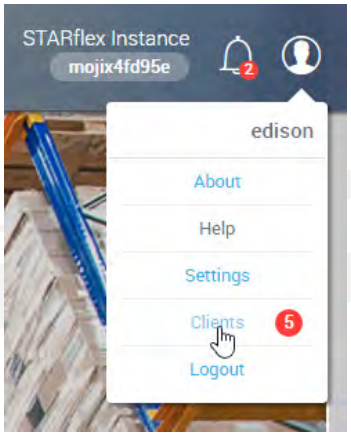
The client list page displays the information of every client that is connected to the STARflex. It includes the IP address, the length of time and the Process ID of each client.

The user can end the process by using the icon, the icon will be disabled for the user's IP so that the user is not be able to end it's own process.

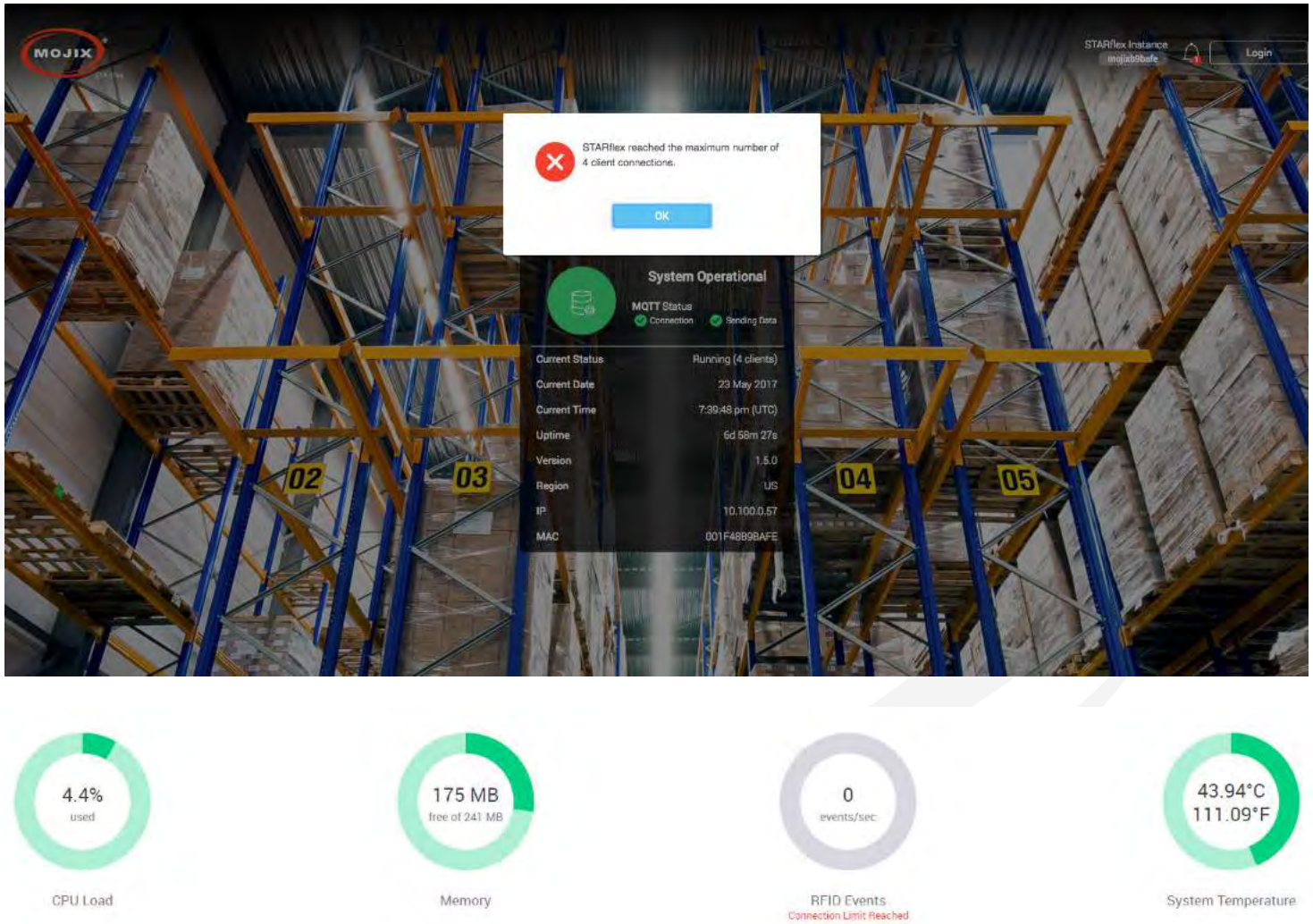
Refresh manually the list by clicking on the icon option , There is the possibility to auto refresh the client list every 10 seconds by selecting the Auto refresh option.



The Client List can be also accessed by clicking on the Client option located at the top right hand corner:



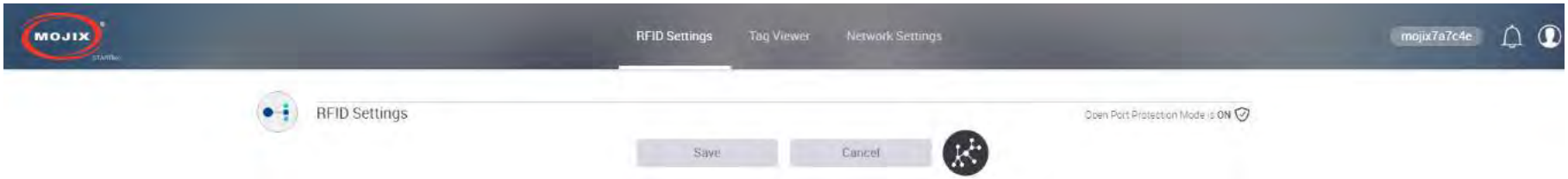
Note: The maximum number of clients connection is **5 (4 http 1 mqtt)**. If it is greater than this connection number, a message will be displayed on the main screen and also on the RFID Events information donut:



CHAPTER III: RFID SETTINGS

3.1 RFID SETTINGS

RFID Settings menu is available after the user logs in to the application with valid credentials. Once in the RFID Settings page, there are six sections to configure the antennas, the default values are presented the first time the STARflex is configured.

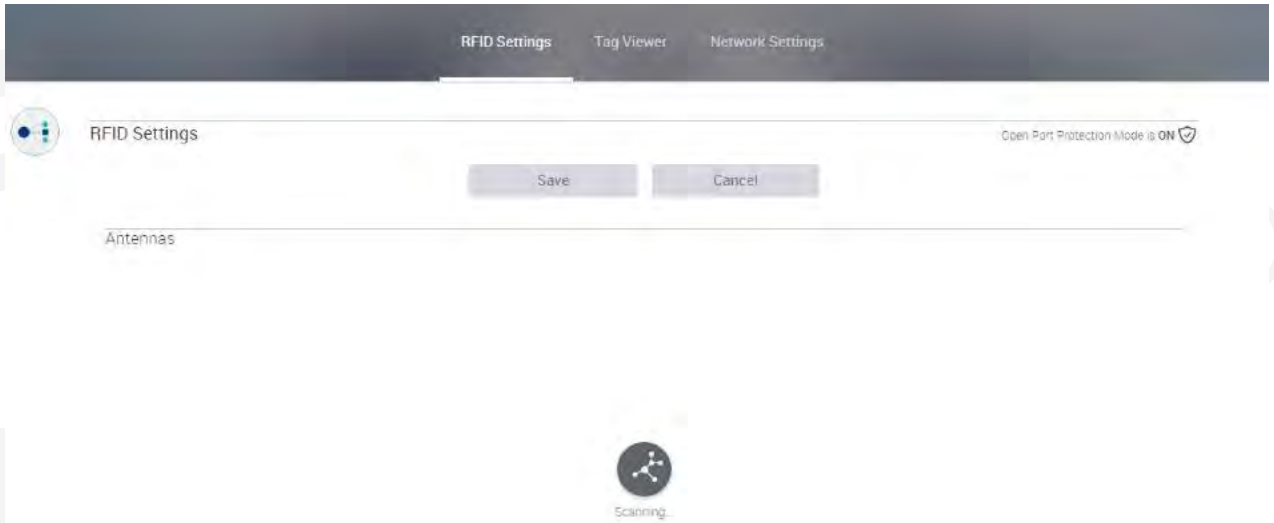


Modifications made on any of the configuration sections can be saved by clicking on the **Save** button and the following message will appear at the top of the section:

Following find the description for each one of the RFID Settings sections.

3.1.1 AUTO DISCOVERY

The auto-discovery process is initiated the very first time a user enters to “RFID Settings” page and every time the user performs a “Default RFID Settings” and a “Firmware Update”and goes to the page. Click on the icon to start scanning antennas.



Supports Auto-discovery of:

- Direct connected antennas
- eXpanders
- eNodes
- GPIOs

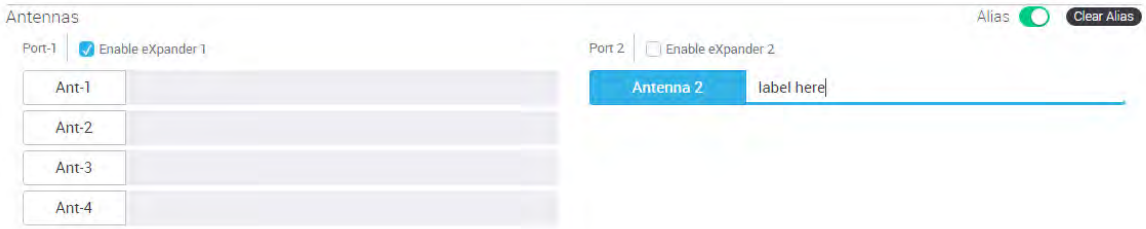
Cannot discover:

- Antennas connected to eXpanders
- Antennas connected to eNodes
- eXpanders connected to eNodes

3.1.2 ANTENNAS

In the Antenna section it is possible to select the antennas. There are four antennas available and each can be expanded into four units, making a total of sixteen antennas. An eXpander can be assigned by checking the “Enable eXpander #” option. The STARflex can simultaneously use both options: with directly connected antennas and with eXpanders.
The power level selection is available per group of 4 antennas. The unit that is used is dBm and the min. value is 20.0 and the max. value is 30. By moving the corresponding slider, the value will increment by 0.5 and the corresponding editable text box will be automatically updated.
There is a Clear button displayed at the top right side of this section which resets the antenna selection only, this does not affect the power.

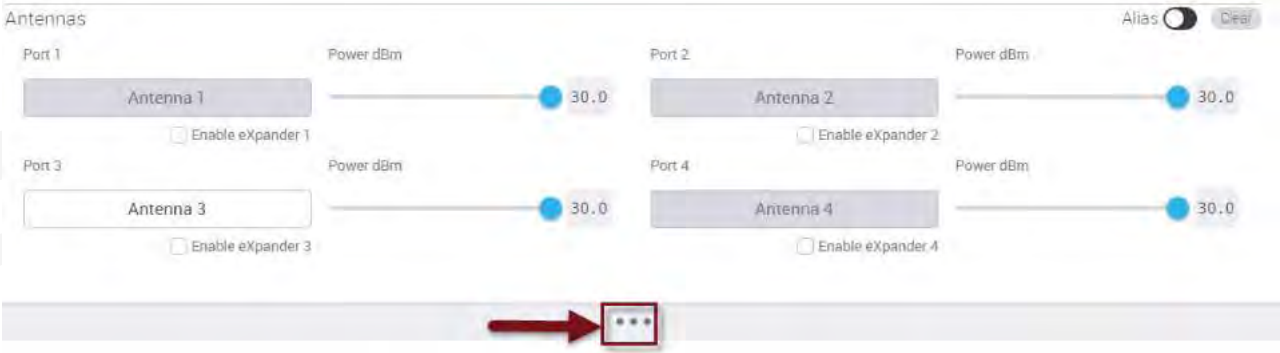
Antennas can be labeled by activating the “Alias” switch.



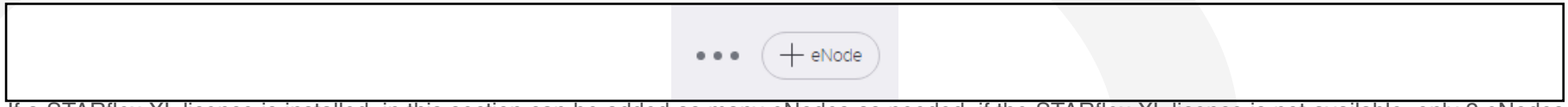
In advanced mode, which is used by professional services, there is the “Loss Compensation” option to increase the power to avoid signal loss by cable length.

3.1.3 ENODE 1 - ENODE 2

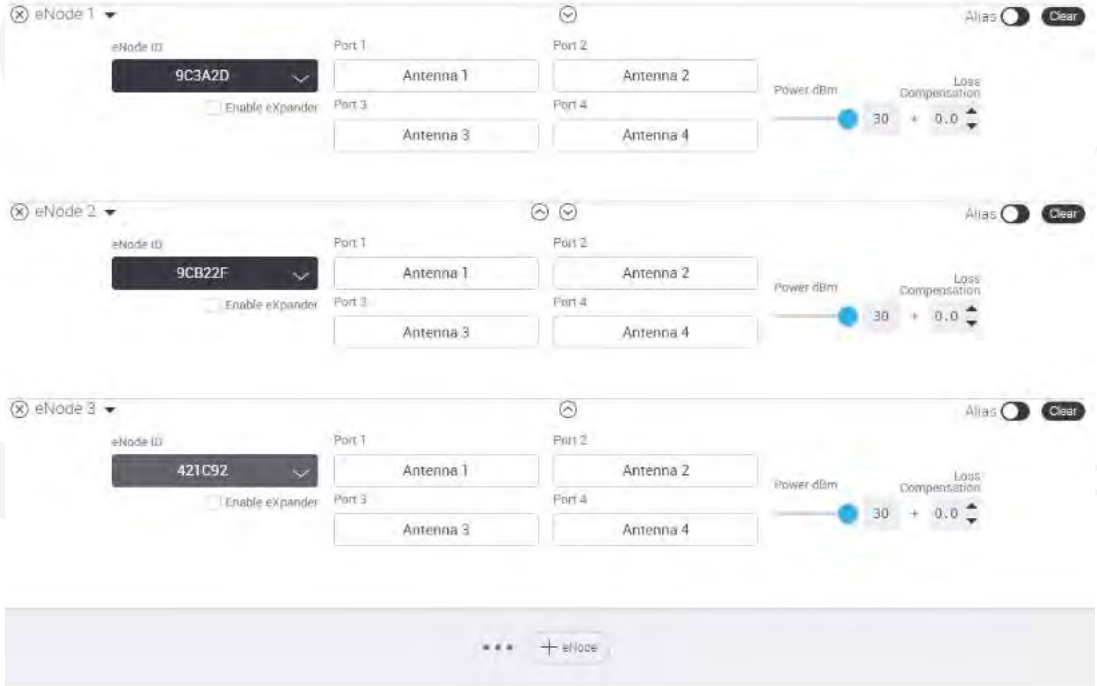
Below the Antennas section there is an eNode section to configure additional eNodes to the STARflex



Once it is clicked the following will appear

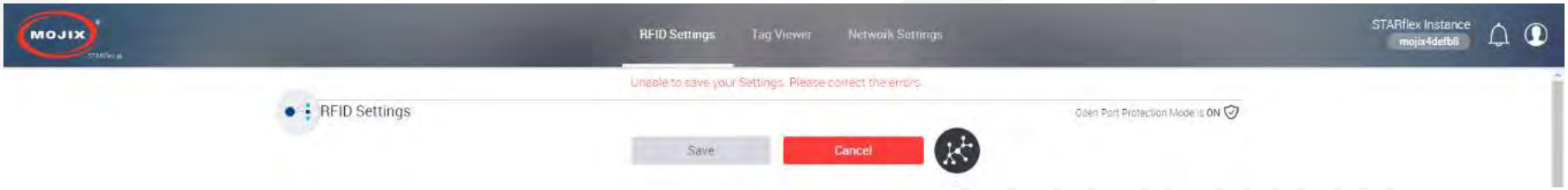


If a STARflex XL licence is installed, in this section can be added as many eNodes as needed, if the STARflex XL licence is not available, only 2 eNodes



In the eNode section, the eNode ID is entered, this field is editable and when the eNode is not entered, all the related options remain disabled.
A single indicator describes if eXpanders are used. eNodes can be configured as either 4-port devices with antennas attached or as 16-port devices with eXpanders attached. The Power selection is available for all antennas (1 per section accordingly), the unit used is dBm, min. value is 20.0 and max. value is 30. When moving the corresponding slider, the value will increment by 0.5 and the corresponding editable text box will be automatically updated.
The **Clear** button is displayed at the top right side, this resets the antenna selection, not the power.

When an eNode ID is entered and no antennas are selected, after clicking save, an error message is displayed at the top of the page and the entire antennas section is marked to notify the user about the missing configuration. The same behavior is displayed with the eNode sections when no port antennas are selected. When the eNode ID is not correct, the text field is marked with a message below it.



If a TurboMux Licence is applied, the TurboMux (TMM) option will be enabled in the eNode section

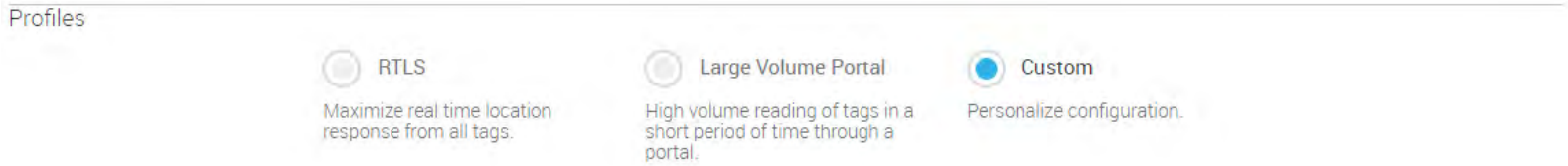
3.1.4 PROFILES

The profiles section display four available options, the first three: "RTLS" and "Large Volume Portal" reflect common RFID modes of operation, the last one "Custom", allows you to personalize the complete configuration.

- The **"RTLS"** profile configuration, maximize real time location response from all tags. An estimated total number of tags covered by the STARflex's set of antennas is required. This profile automatically selects the session S1, the target group A, a Q value calculated according to the estimated number of tags entered, an LF of 256 kHz., a modulation M4 and the selects enabled.

- The **"Large Volume Portal"** profile configuration, read high volume of tags in a short period of time through a portal. An estimated maximum number of tags that will be moved through the portal is required. This profile automatically selects the session S1, the target group A, a Q value calculated according to the estimated number of tags entered, an LF of 256 kHz., a modulation M4 and the selects disabled.

- The **"Custom"** profile configuration, allows the user to personalize the settings. Three sections are enabled selecting this option: "**2nd Receive Antenna Mode**", **"Physical Layer Settings"** and **"Select Pattern"**.



3.1.5 2ND RECEIVE ANTENNA MODE

**Available only in Advanced Mode*
In this section there are two options available, none and auto:

- **None:** No 2nd receive antenna.
- **Auto:** Automatically generated configuration to cycle through all antennas not currently transmitting.

To save the configuration click on the “Save” button, to discard any changes and go back to the last configuration click on the “Cancel” button. The buttons

3.1.6 PHYSICAL LAYER SETTINGS

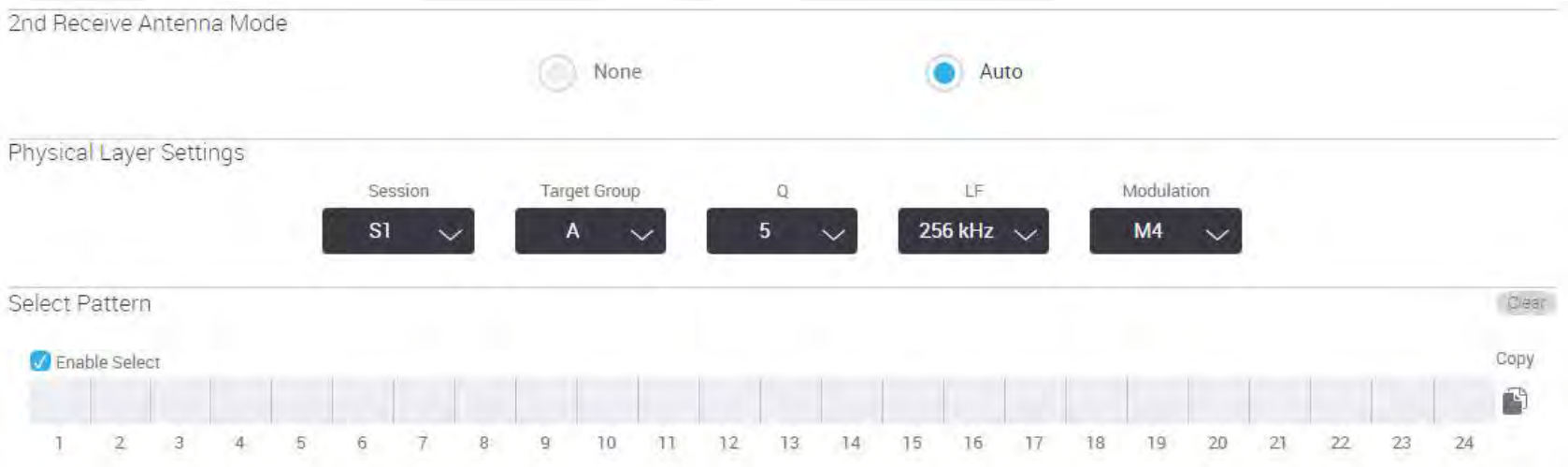
This section allows the user to select different options for the physical layer, there are five combo-boxes available: Session, Target Group, Q, LF and Modulation.

- **Target Group:** Default value is A
- **Session:** Sets the session bit to select and query. Default value is S1.
- **Q:** Number of slots 2Q. Default value is 5
- **LF:** Tag backscatter rate. Default value is 256 kHz
- **Modulation:** Select a Modulation. Available values: **M2**, **M4**, **M8** and **FM0**. Default value is Miller-4.

To save the configuration click on the “Save” button, to discard the changes and go back to latest configuration click on the “Cancel” button. Both buttons are at the very top of the page.

3.1.7 PATTERN

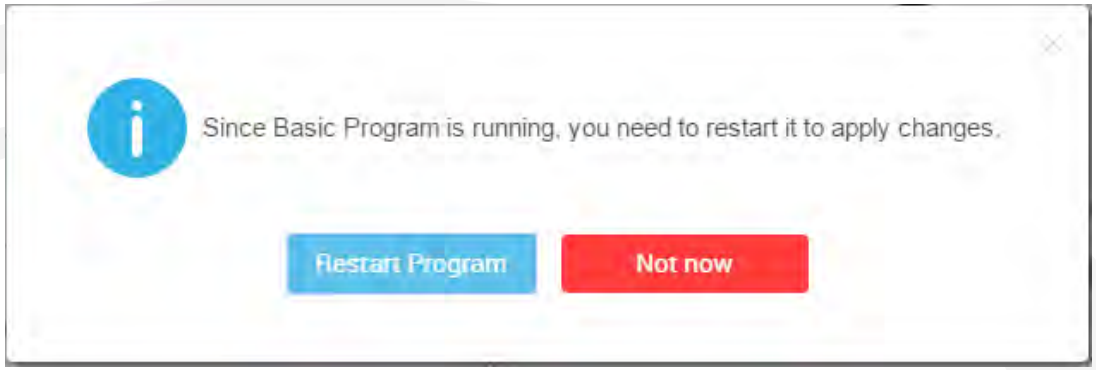
In this menu, the Mask is available to edit if the “Enable Select” option is selected, otherwise the mask is disabled.
Once the mask is enabled, it is possible to select the mask pattern, which is a hexadecimal value representing the bit pattern used to match and select a subset of the tags EPC number separating this tag from the total tag population.
The beginning of the pattern is always bit position 32, the pointer and length will be auto calculated based on the pattern entered.



STARflex

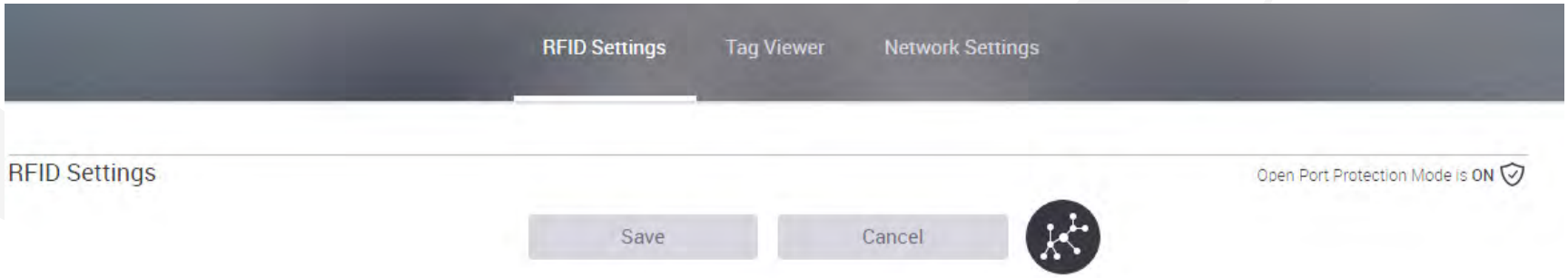
3.1.8 BASIC PROGRAM RUNNING

When the basic program is running (started in the “Tag Viewer” menu) and changes in the RFID settings are done, these are not applied until the program is restarted. When pausing the readings, the changes are not applied as only the interface is paused but not the readings in the background. When any change is saved in RFID settings, a dialog is displayed asking the user to reboot at that moment or later.

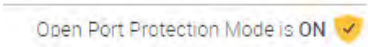


3.1.9 OPEN PORT PROTECTION MODE

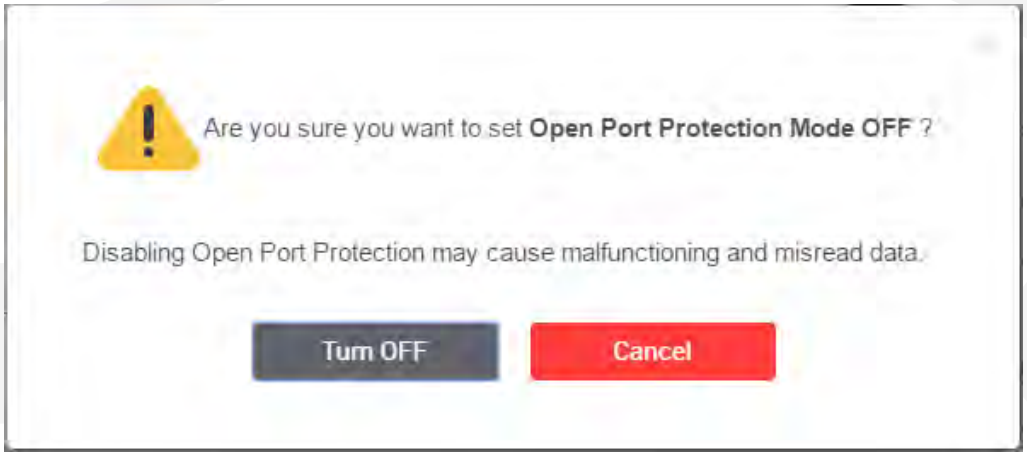
This feature is used to prevent the STARflex from transmitting through an open port (port with no antenna detected or attached) thus preventing malfunctioning or misread data.



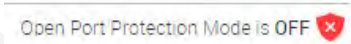
When in basic mode this feature can not be turned off, if deactivation is needed, login into advanced mode and the icon will change as follows:



Click on the icon and the following message will pop up and the icon will change:

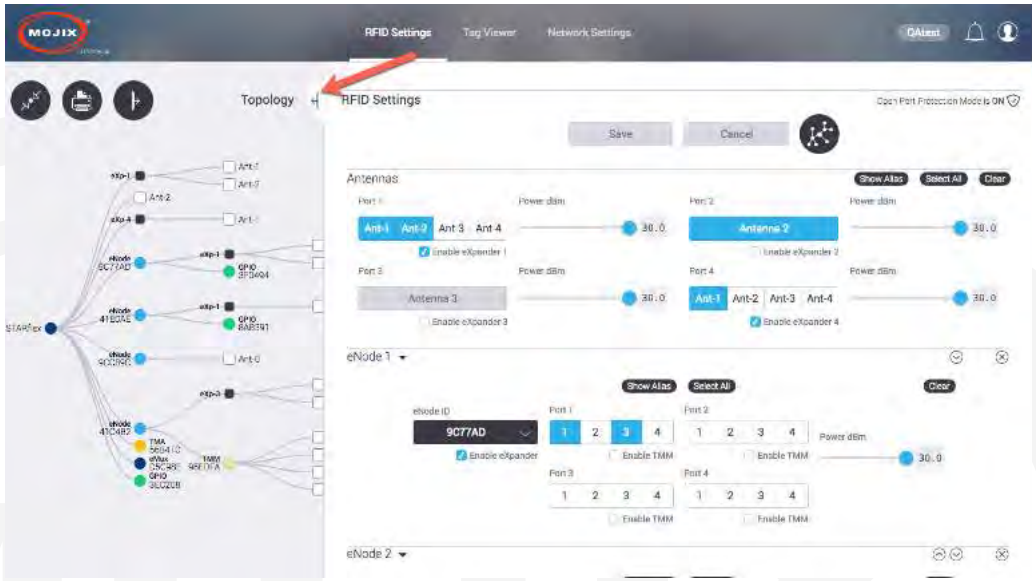


When turned off the icon changes as follows:

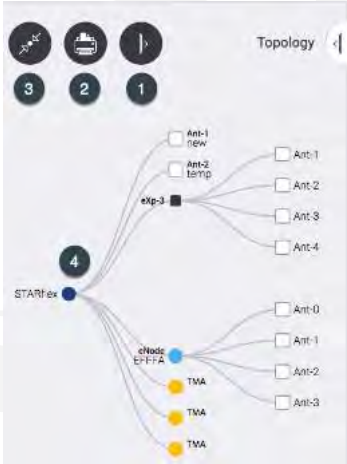


3.1.10 TOPOLOGY

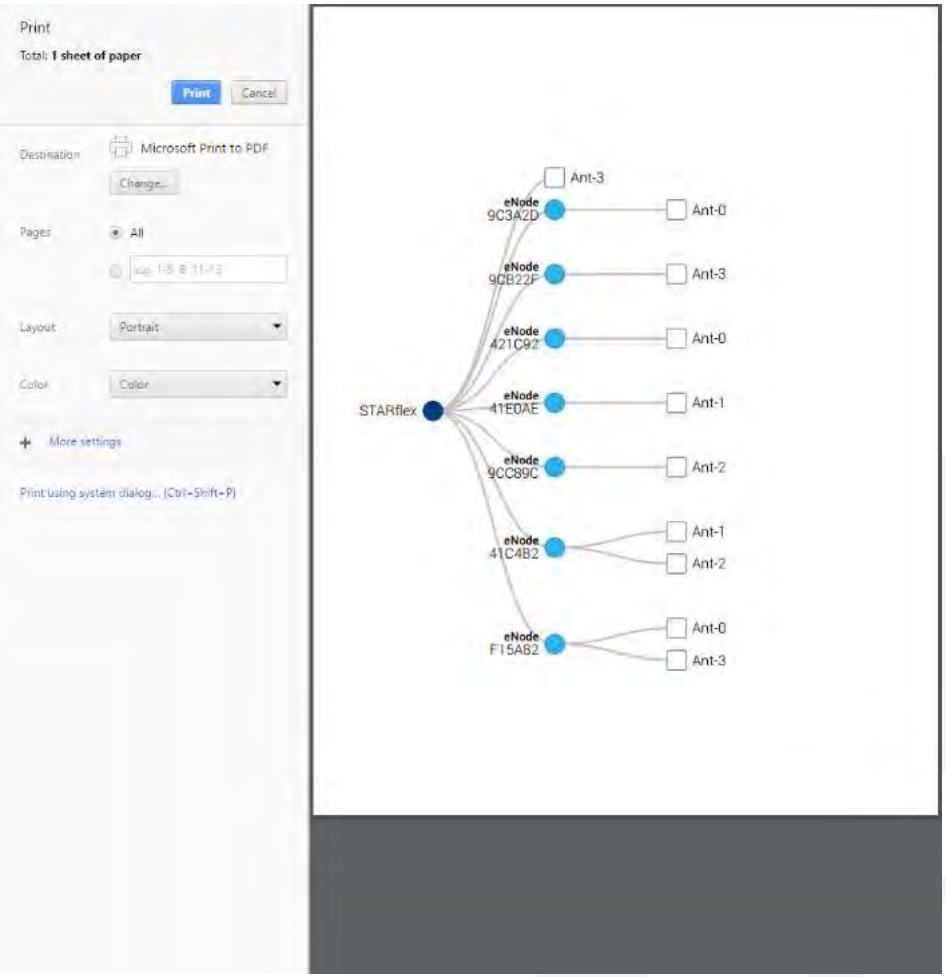
This feature displays a map of all the connections the STARflex has, it is opened when clicking in the following icon:



Once the topology map is displayed it shows all the connections to the STARflex (Antennas, eNodes, eXpanders, GPIO, etc.)



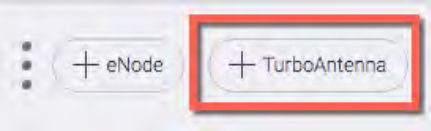
1. **Expand View:** This options allows the topology map to be displayed in fullscreen mode.
2. **Print:** It opens the Print Menu for the topology.



3. **Expand Nodes:** It expands and contracts all the devices at once.
4. **Topology Map:** It graphically displays the connections, it includes the labels for each connection, it can be zoomed in and zoomed out by using the mouse's scroll wheel, specific parts can be contracted or expanded by clicking on them.

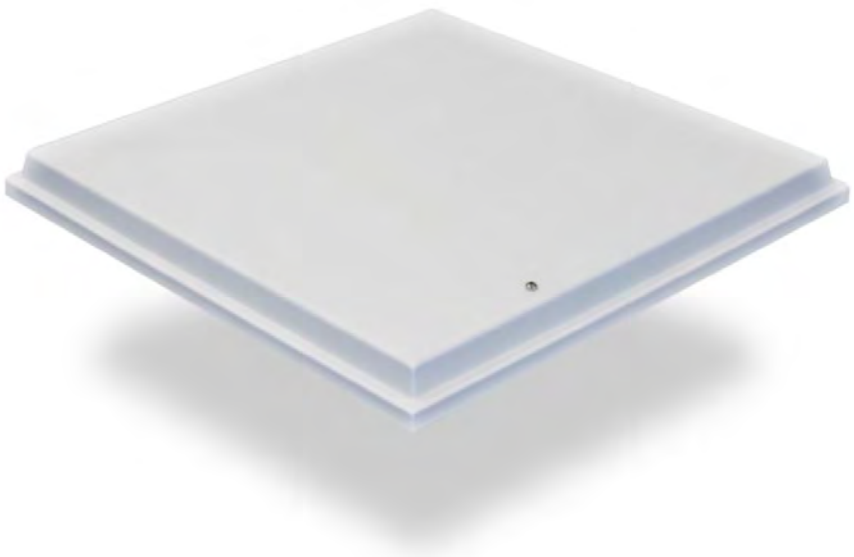
3.1.11 TURBO ANTENNA TMA-2000

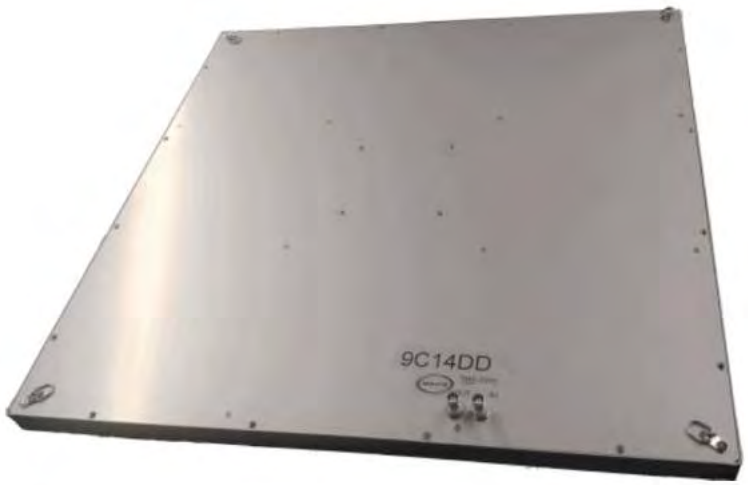
The Turbo Antenna option is available next to the eNode section.



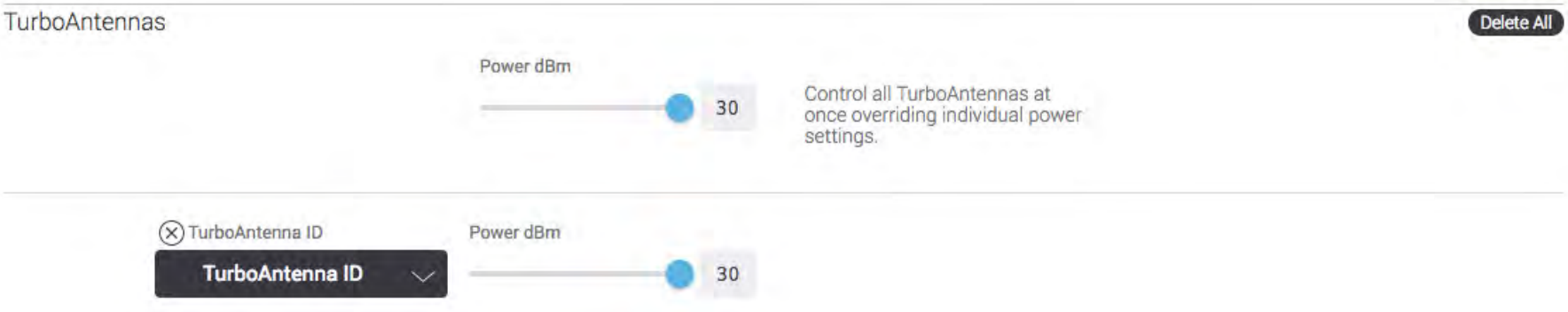
The Mojix TurboAntenna TMA-2000 is the latest addition to the STARflex and STAR 3000 system. It offers the functionality of a Mojix eNode with a single integrated phased array antenna.

The TurboAntenna TMA-2000 is an RF transmitter, designed to excite all types of EPC UHF Gen 2 RFID tags within its designated RFID coverage area. It works in conjunction with either a STARflex or a STAR 3000 system. STARflex/STAR 3000 provides DC power, control signal, and the RF signal to the TurboAntenna TMA-2000 unit via coax cable.
TurboAntenna TMA-2000 adjusts the power level of the RF signal and feeds it to an integrated phased array antenna such that the maximum radiated power from the antenna is at or below the regulatory limit. Multiple TurboAntenna TMA-2000 units can be daisy chained together to cover the desired area. But only one TurboAntenna TMA-2000 can transmit at any given time.





When the icon is clicked the menu for Turbo Antennas is displayed, allowing the user to control the Power dBm for each one or all at the same time.

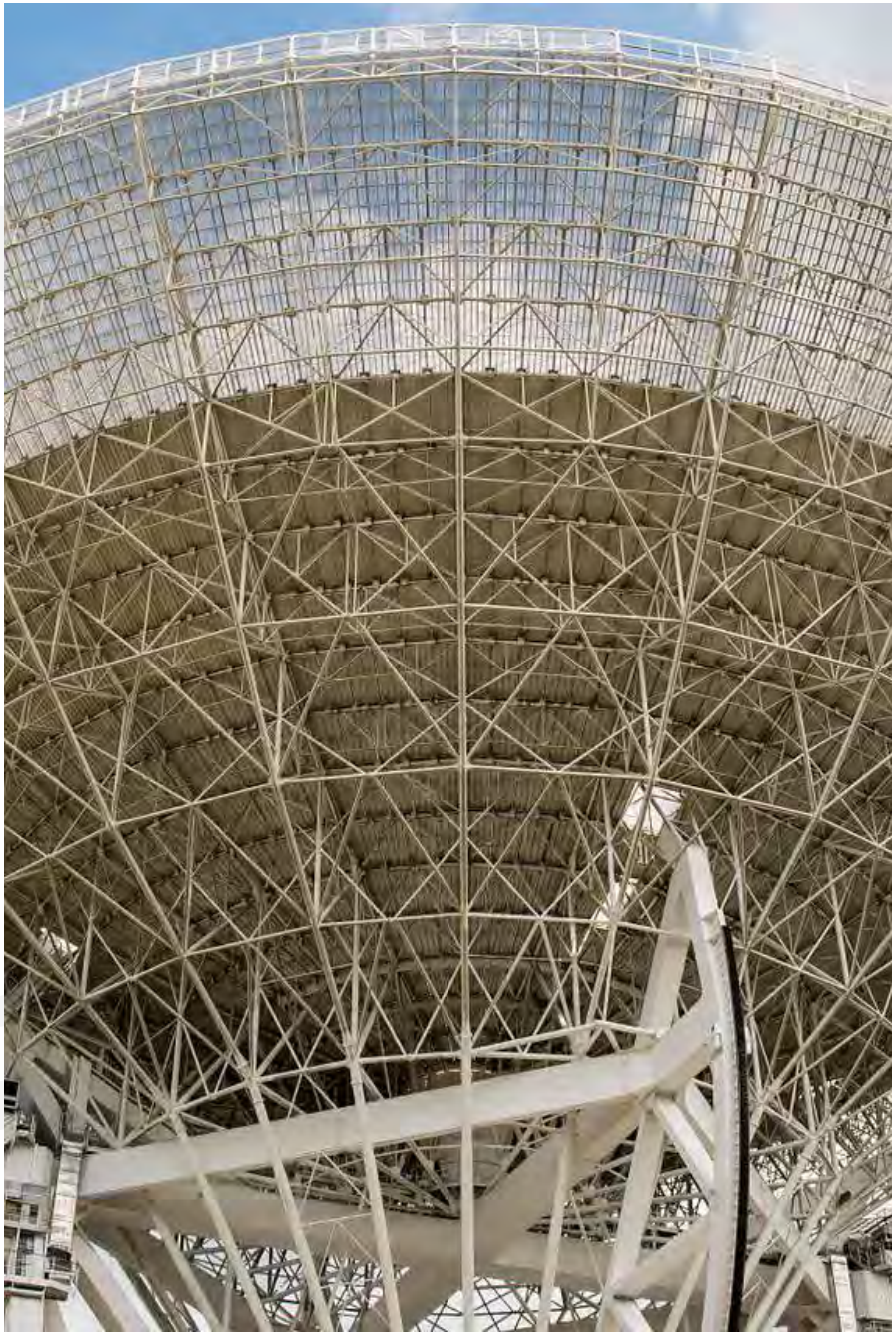


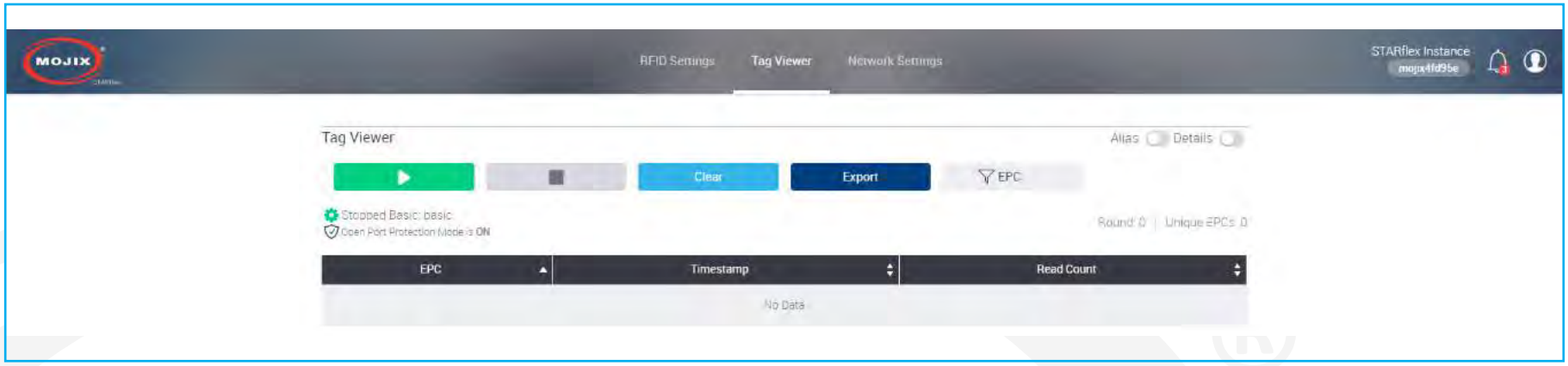
CHAPTER IV: TAG VIEWER

4.1 TAG VIEWER

The tag viewer menu allows the user to turn on RFID programs in order to find and read tags, displaying all the tag found results in a list. In addition, it is possible to filter while live reading the EPCs, TxID (transmit antenna) and export the list in CSV file.

The Tag Viewer option is available after the user logs in to the application with valid credentials. Once inside the Tag Viewer option, the default view is the list in the simple mode (EPC, Timestamp, Read Count columns) , without data displayed or RFID program running.

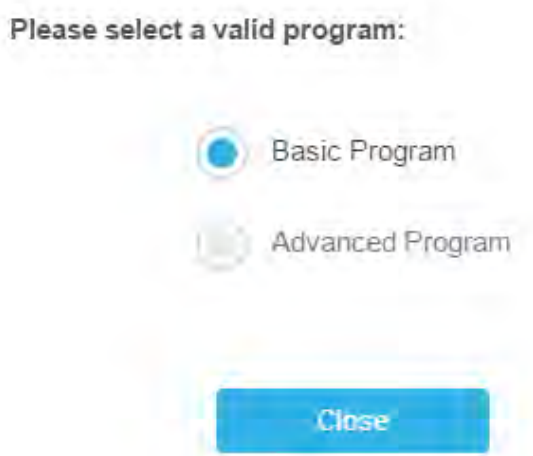




Once the user clicks on the PLAY button (green), the very first time, a popup window will appear requesting the user to select a valid program before running the process. The two possible options are “Basic Program” and “Advanced Program ” (with a list of available advanced programs).

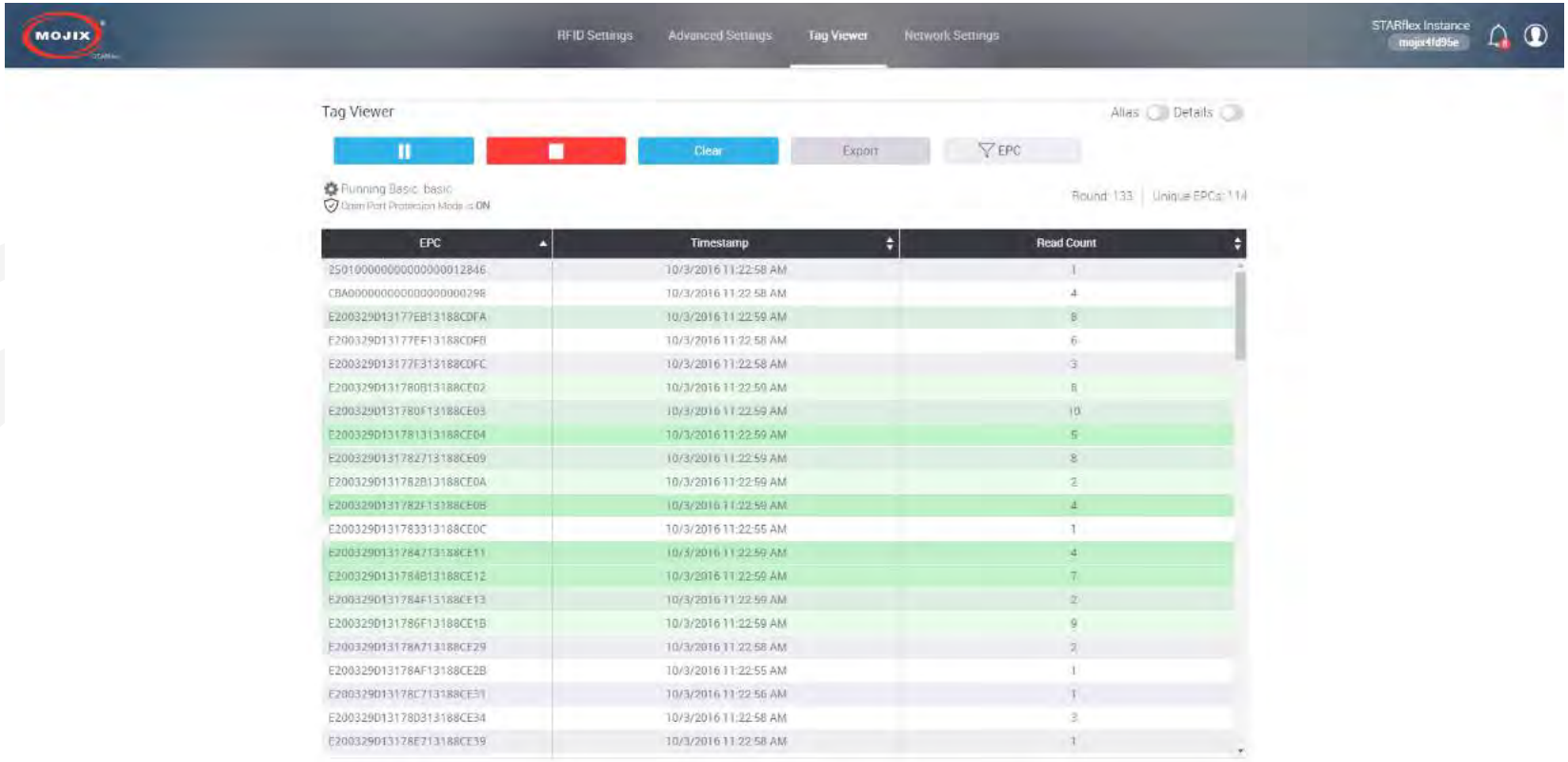
Basic Program, which is always available, refers to the basic RFID program that is in the STARflex system. In the API document it is also called simpleRFID program that is overwritten when modifying the RFID settings.

Advanced Program refers to a RFID programs created in the advanced mode by using the program generation module. There are also RFID programs created by a 3rd party application such as MCON or VIZIX.

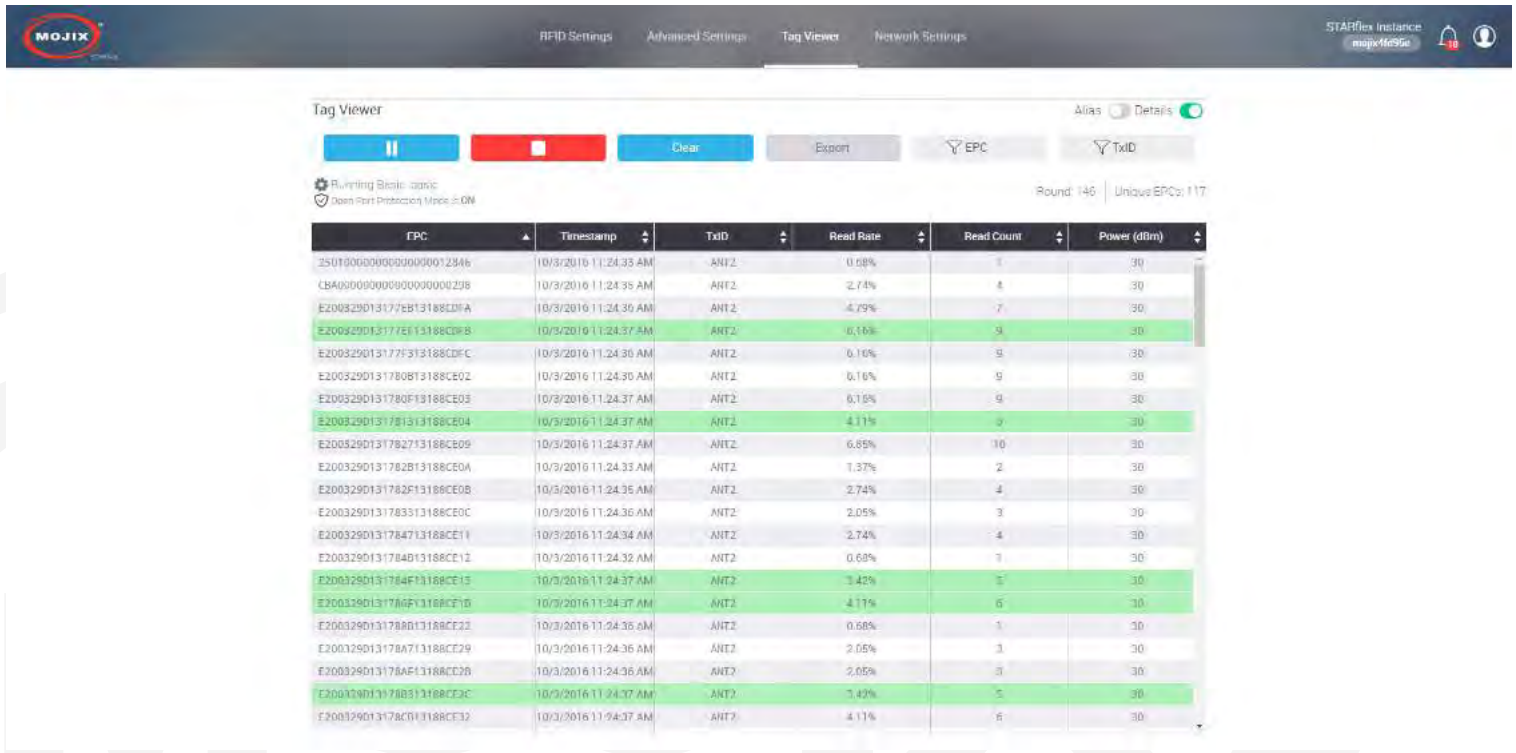


Once the user selects the RFID program and clicks continue, the program is selected The results will be displayed in simple mode by default, however there is a detailed mode which displays a more detailed view.

Simple mode view will display one row for EPC tag. The columns for each row shall be EPC , Timestamp, and Read Count. The column Read Count will display the total number of TagReadData packets that match the EPC.



To view the results in **Detailed mode**, there is a switch at the top right side of the page, once it is enabled the results will be expanded showing one row for each EPC, tx Antenna Port, tx Expander Port and power tuple. The columns for each row shall be EPC, Timestamp, TxID (transmit antenna), Read Rate, Read Count, Power.



When switching between the **Simple** mode and **Detail** mode the data will be persistent, the only difference should be the way this data is displayed.

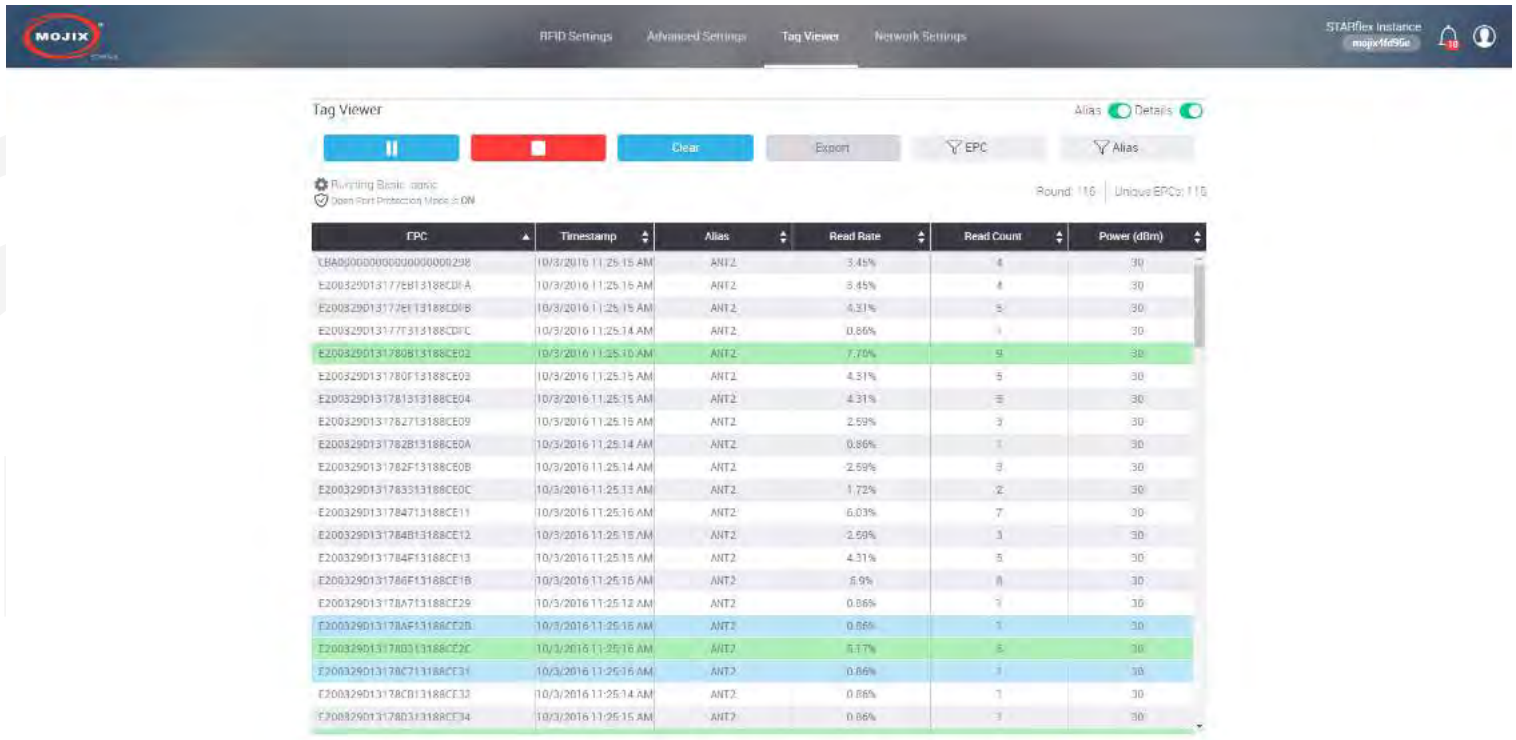
While the process is running and the tags are being read, if the PLAY button (green) is clicked, the color changes to blue and the button becomes a PAUSE button, the STOP (red) and the CLEAR (blue) buttons are enabled, and the EXPORT button is disabled.

The PAUSE button (blue) pauses the user interface only, the process is still reading the tags in background, once clicked its color changes to green with the PLAY button replacing the PAUSE one. The STOP (red), CLEAR and EXPORT buttons are enabled

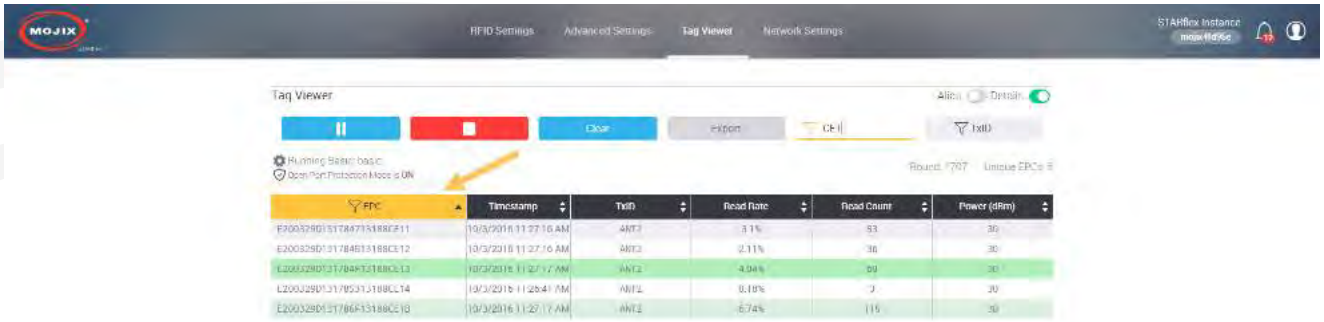
Clicking the STOP button will tell the STARflex to stop the RFID reads, it does not close the SSE socket previously opened with GET .../rfid/events.
Clicking on the CLEAR button will clear all the results currently displayed.

The EXPORT button will be enabled only when a program is stopped or paused and it will export all the displayed results at that moment in a CSV file.
Besides the buttons, there are two autocomplete filters, EPC and TxID (only in detailed mode), that while the user is typing, the results will be automatically filtered.

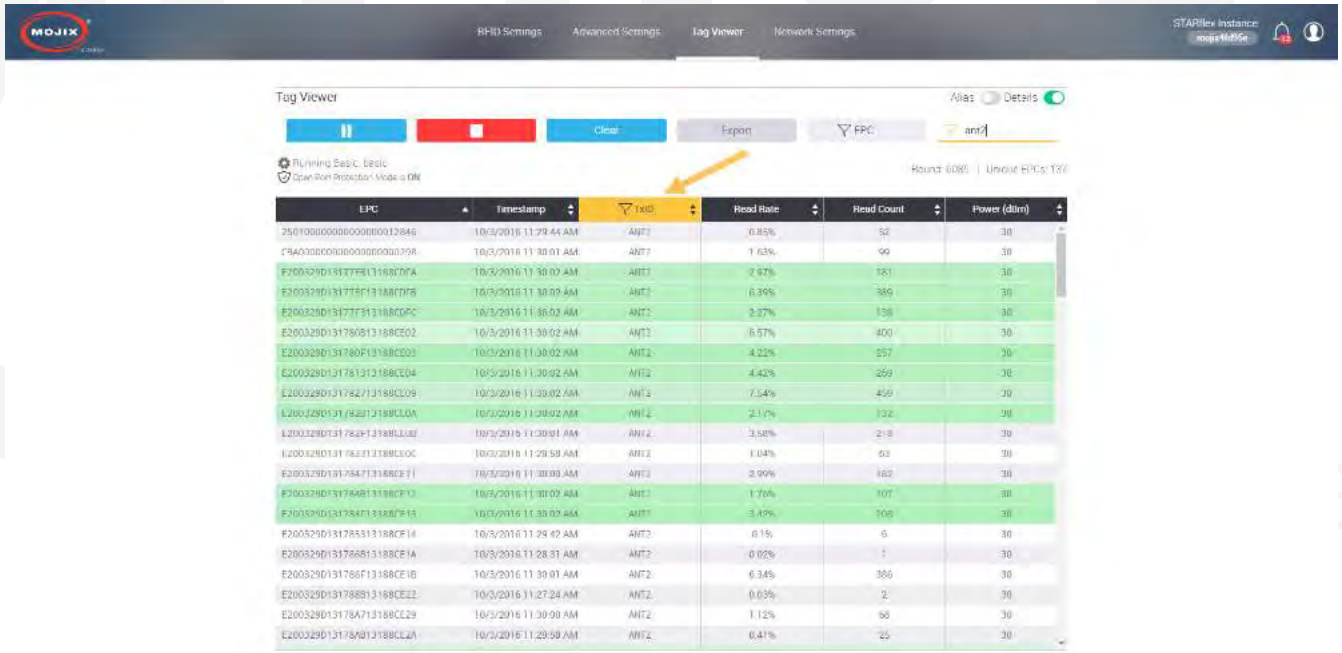
When viewing in Alias mode, the TxID will be replaced by the label of the antenna placed in RFID settings.



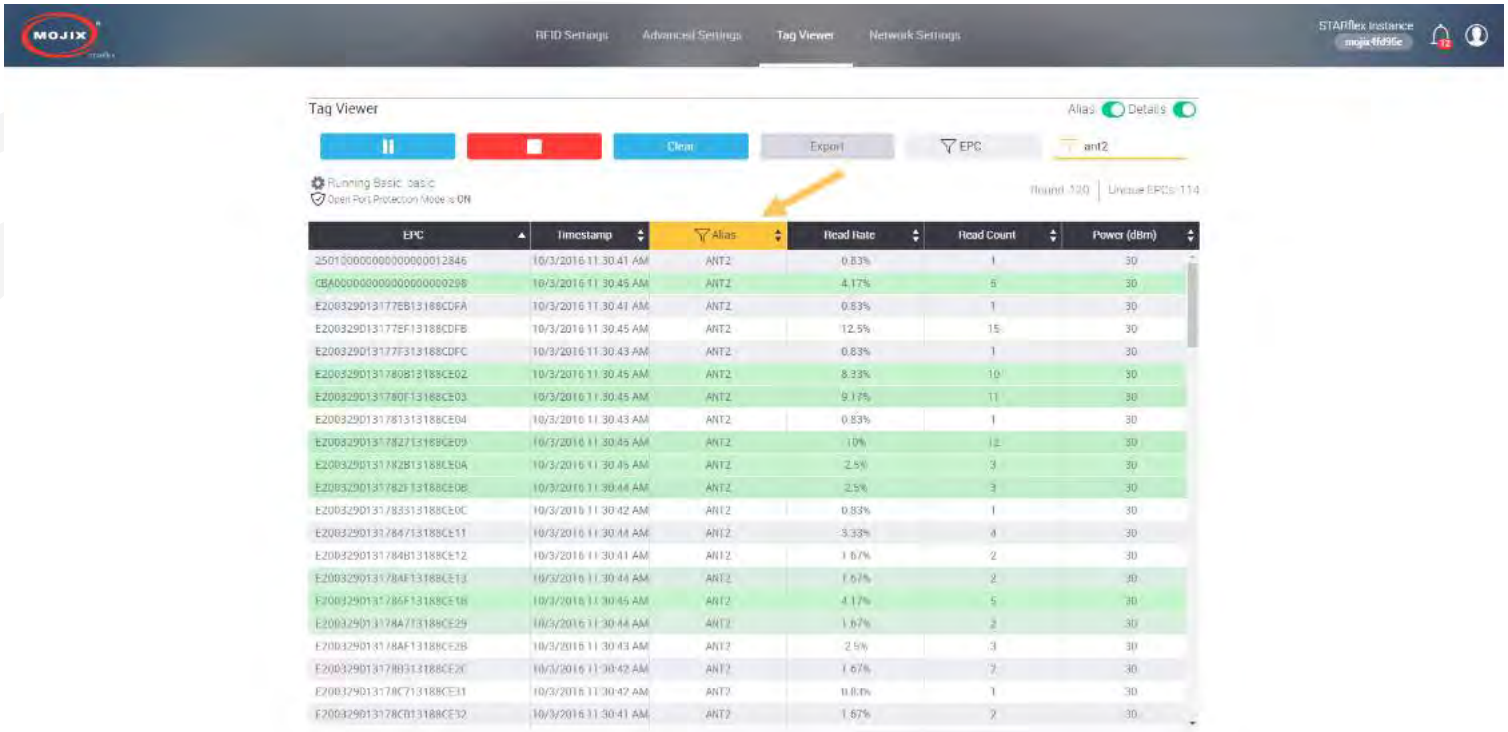
A blank space is a logical “or”: Example: 300 056 searches for pattern 300 or 056. Note that we do not use or as logical or.



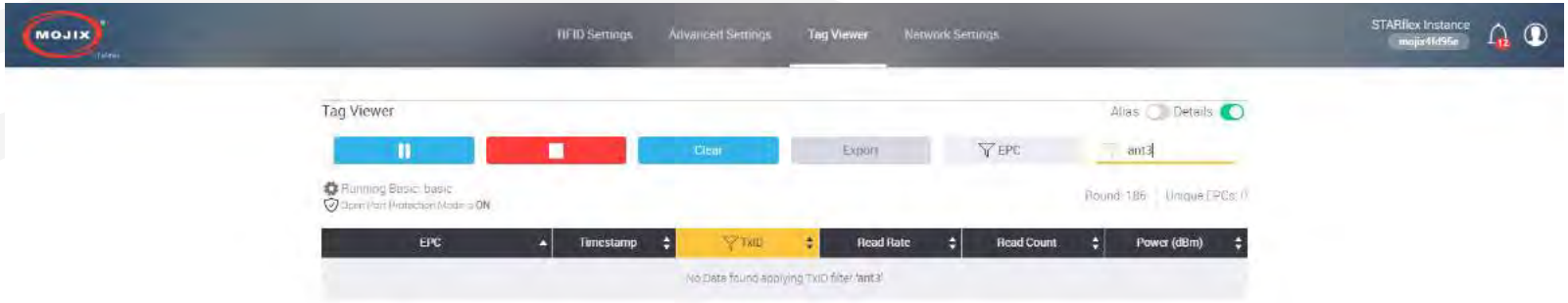
In addition, the column associated to the filter will be higlighted:



The search can be performed by TxID or by Alias



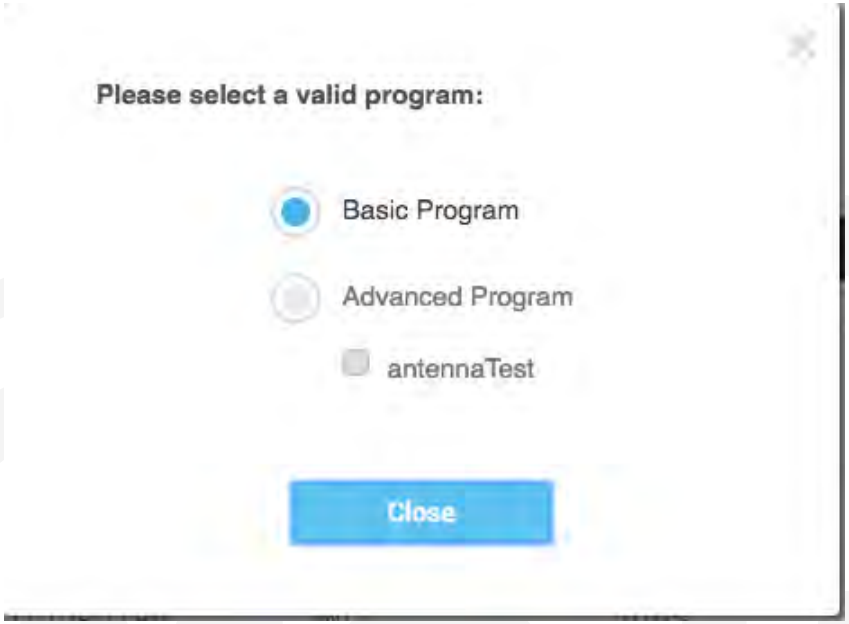
If no results are found the following message will display:



Below the mentioned buttons and above the results table, a gear icon, the number of Rounds and the number of Unique EPCs are displayed.
The Code Wheel allows the user to change the program (Basic and Advanced), it is disabled while the RFID program is running, once the program is stopped, the code wheel is enabled. The label next to the code wheel shall correspond to the following:

- **While running:** Running Basic or Advanced: <filename>
- **While stopped:** Stopped Basic or Advanced: <filename>
- **While paused:** Paused Basic or Advanced: <filename>

Clicking in the Code Wheel will open a new dialog box and it is possible to change the program between Basic and Advanced. For the advanced settings there is a list presented with the available program files resident in the STARflex.

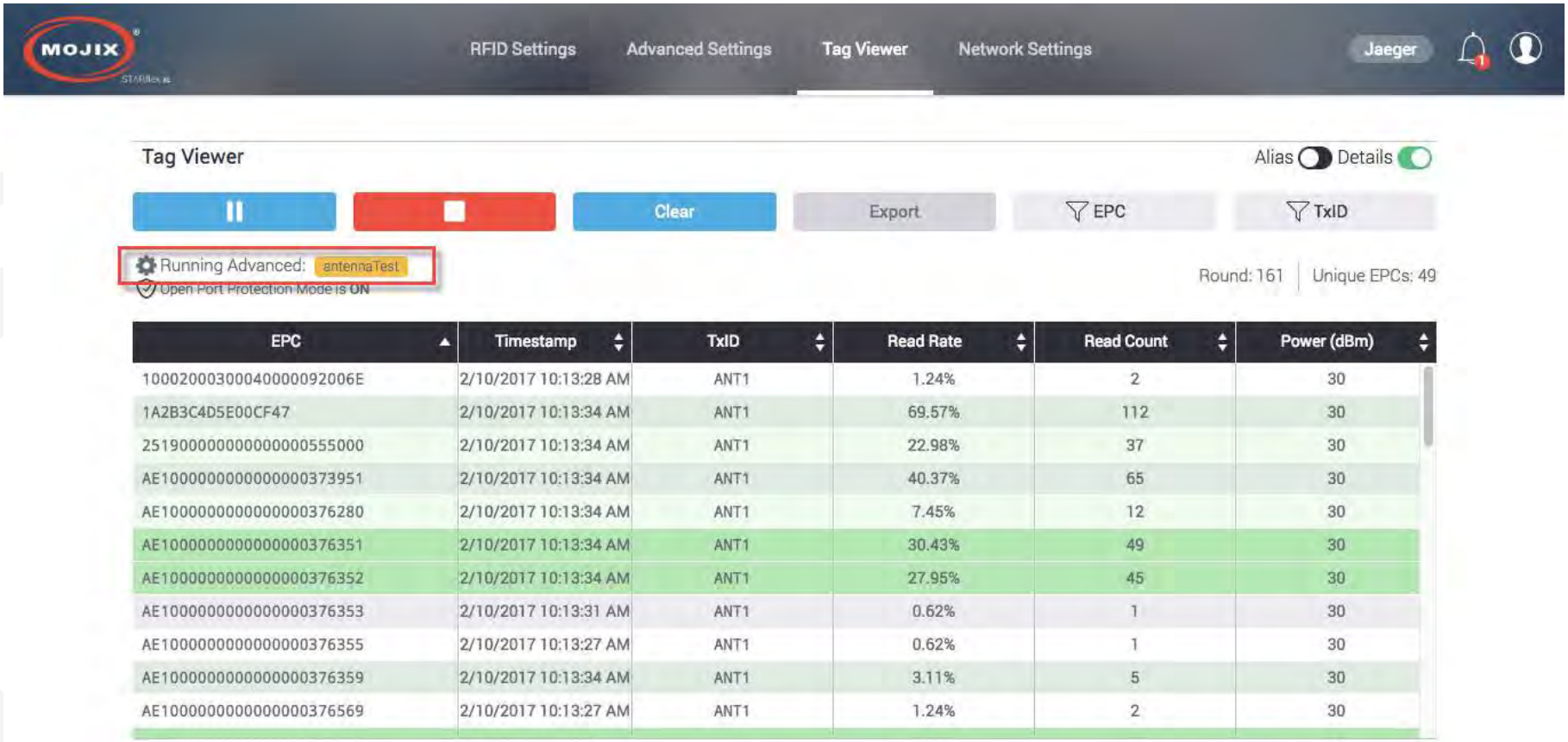


In the results table there is a color code for the tag readings. The default background color is white. When a new tag comes in, it is displayed in a blue background. The background transitions to white are over 0.5 sec.

When a tag is read but it has been displayed before, this tag is updated in place by painting the background green. The green background fades to white over 0.5 sec, for a tag that is read much faster than the 0.5 sec, that tag row essentially stays constant green. So it is easy to tell at a glance which tags are reading well or which tags may be only just reading, for example.

EPC	Timestamp	TxID	Read Rate	Read Count	Power (dBm)
	10/3/2016 4:02:16 PM	ANT2	0.03%	1	23.5
2501000000000000000012846	10/3/2016 4:02:37 PM	ANT2	0.09%	3	23.5
E200329D13177EB13188CDFA	10/3/2016 4:02:59 PM	ANT2	0.5%	17	23.5
E200329D13177EF13188CDFB	10/3/2016 4:03:05 PM	ANT2	3.03%	102	23.5
E200329D13177F313188CDFC	10/3/2016 4:03:02 PM	ANT2	0.89%	30	23.5
E200329D131780B13188CE02	10/3/2016 4:02:55 PM	ANT2	1.07%	36	23.5
E200329D131780F13188CE03	10/3/2016 4:03:04 PM	ANT2	1.75%	59	23.5
E200329D131781313188CE04	10/3/2016 4:03:03 PM	ANT2	1.69%	57	23.5
E200329D131782713188CE09	10/3/2016 4:03:05 PM	ANT2	2.14%	72	23.5

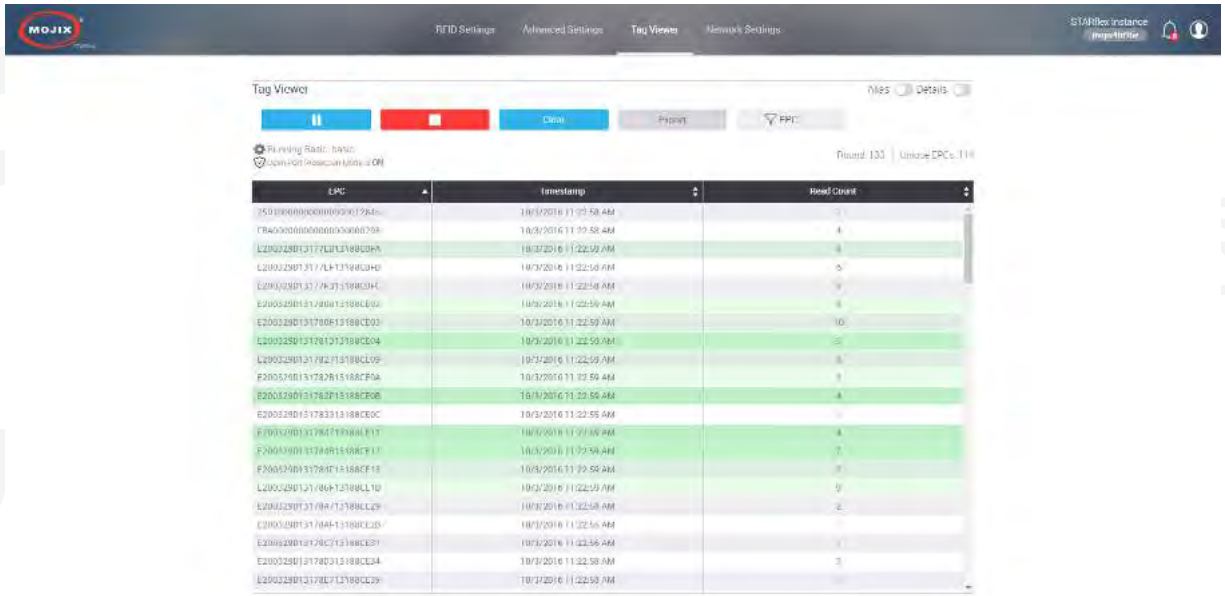
When the Antenna Test program from Advanced mode is running, the name will be highlighted.



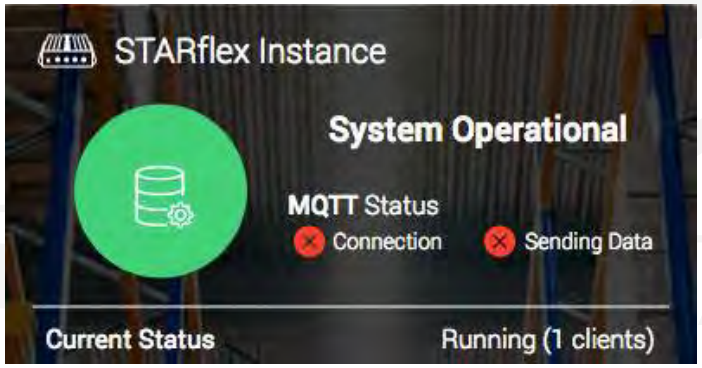
EPC	Timestamp	TxID	Read Rate	Read Count	Power (dBm)
1000200030004000092006E	2/10/2017 10:13:28 AM	ANT1	1.24%	2	30
1A2B3C4D5E00CF47	2/10/2017 10:13:34 AM	ANT1	69.57%	112	30
2519000000000000000555000	2/10/2017 10:13:34 AM	ANT1	22.98%	37	30
AE100000000000000373951	2/10/2017 10:13:34 AM	ANT1	40.37%	65	30
AE100000000000000376280	2/10/2017 10:13:34 AM	ANT1	7.45%	12	30
AE100000000000000376351	2/10/2017 10:13:34 AM	ANT1	30.43%	49	30
AE100000000000000376352	2/10/2017 10:13:34 AM	ANT1	27.95%	45	30
AE100000000000000376353	2/10/2017 10:13:31 AM	ANT1	0.62%	1	30
AE100000000000000376355	2/10/2017 10:13:27 AM	ANT1	0.62%	1	30
AE100000000000000376359	2/10/2017 10:13:34 AM	ANT1	3.11%	5	30
AE100000000000000376569	2/10/2017 10:13:27 AM	ANT1	1.24%	2	30

Concurrent users

When different users enter to the Tag Viewer section and START or STOP the tag reading, it is possible for them to see if another user is doing the same action. A message is displayed notifying that another user has started or stopped the RFID program and the corresponding buttons (PLAY and STOP) are enabled or disabled accordingly.



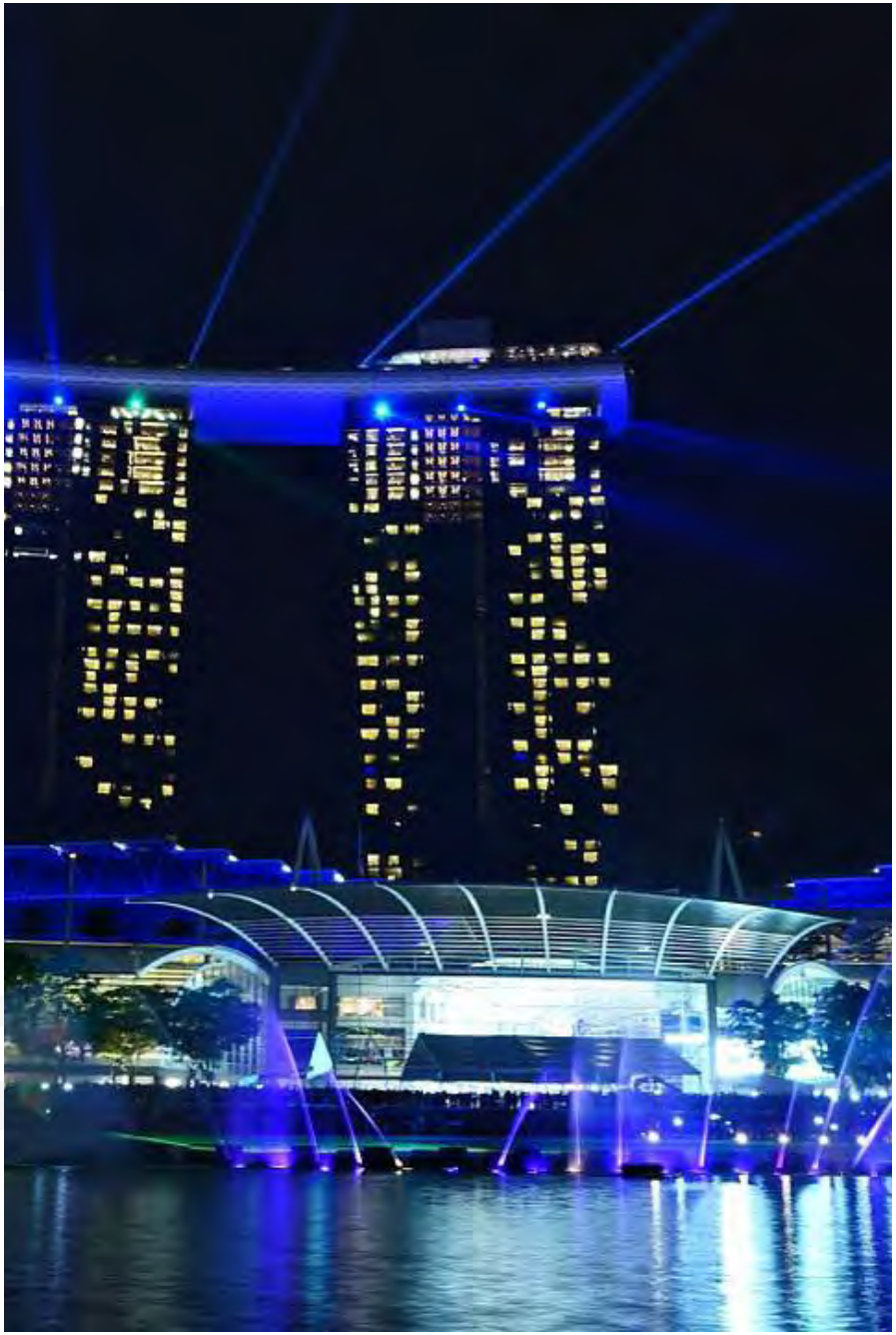
When a user is in the landing page, the current status of the STARflex also changes accordingly, if an RFID program is running or not. “**Running**” will be displayed if a program is running, “**Idle**” if not.



CHAPTER V: NETWORK SETTINGS

5.1 NETWORK SETTINGS

The Network Settings menu is available after the user logs in to the application with valid credentials. Once in the Network Settings menu, it is possible to configure the STARflex to the network that this is going to use. For this the following fields are available:



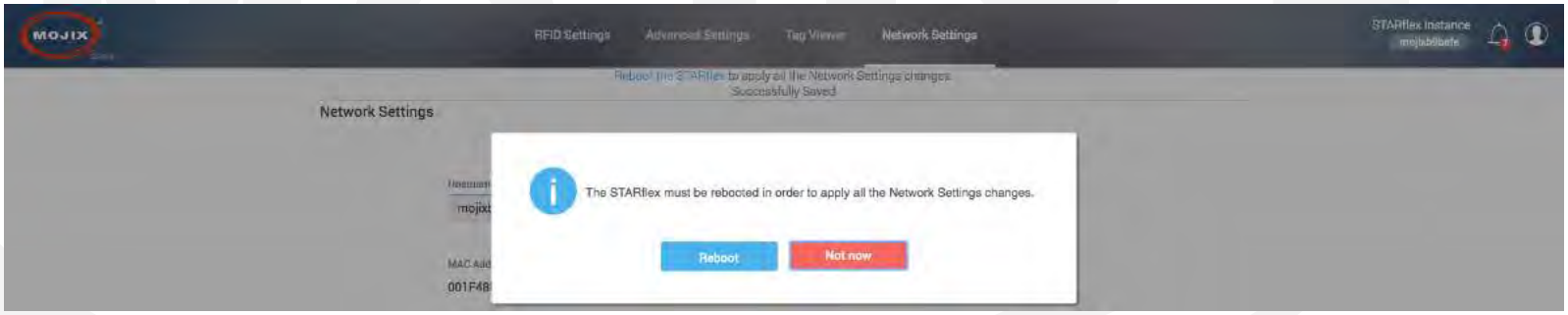
Hostname: Always editable to set the hostname.

MAC Address: Displays the STARflex MAC Address

DHCP: Three fields for DHCP are available, IP address, netmask and gateway. If the option to enable DHCP is selected, the fields will be disabled and the corresponding data will be auto populated. If DHCP is disabled, fields will be available to assign manually.
Next to the field for the IP address there is a label for the temporary IP address which indicates the default IP address of the STARflex.

DNS: Two entries for DNSs are available, if DHCP is enabled, these will be disabled with the corresponding data auto populated.

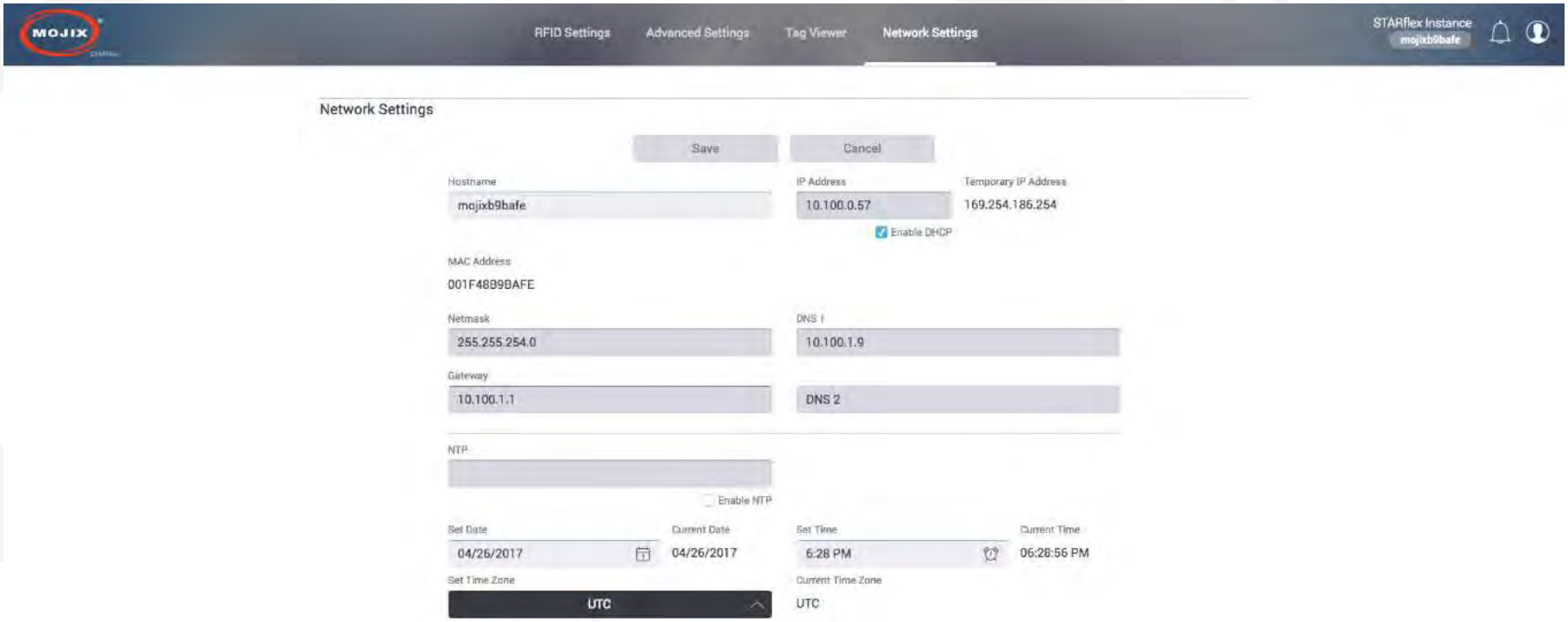
After modifying the hostname, IP address, netmask, gateway, DHCP, or DNS, a reboot of the STARflex is required in order to apply the changes, so after modifying any of these fields a dialog with a message is displayed asking to reboot the STARflex. It is also possible not to restart the STARflex at the moment, in that case a message will remain at the top of the “Network Settings” page.



NTP: Single entry for NTPs is displayed and available to edit only when the option “Enable NTP” is selected.

If NTP is enabled the fields “Set Date” and “Set Time” will be disabled.

Date, Time & Timezone: A field to set the date, time and timezone are available. The fields display the user’s machine date, time and timezone by default. Clicking on the “Set Date” field a datepicker is displayed in order to choose the date. Clicking on the “Set Time” field a time picker is displayed in order to choose the time for the STARflex.
There are labels to show the current date, time, and time zone, the labels show the current values configured in the STARflex. These values are the same as the ones displayed in the landing page.

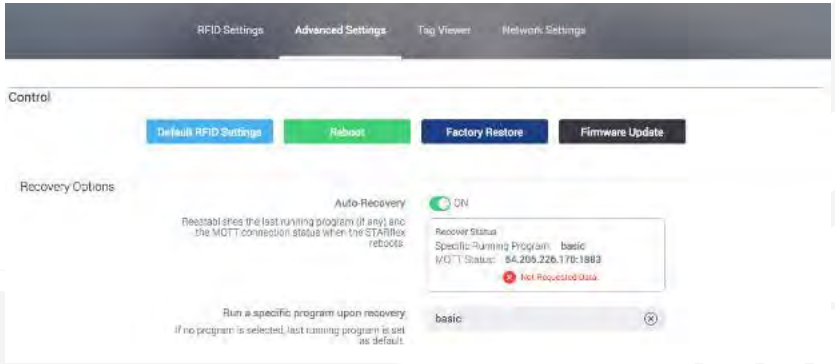


CHAPTER VI: CONTROL

6.1 CONTROL

In order to access to the Control menu, the user must be logged into the application, after that the user must select “Advanced Mode” option and provide the password to have the advanced mode option visible in the menu, once visible and click on it, a group of options will be displayed including “Control”.

Once in the Control page, there are four visible buttons, Default RFID Settings, Reboot, Factory Restore and Firmware Update. On the lower part there is the Recovery Options section.



Once this option is clicked and after confirming the action, the application will reset all the RFID

6.1.1 DEFAULT RFID SETTINGS

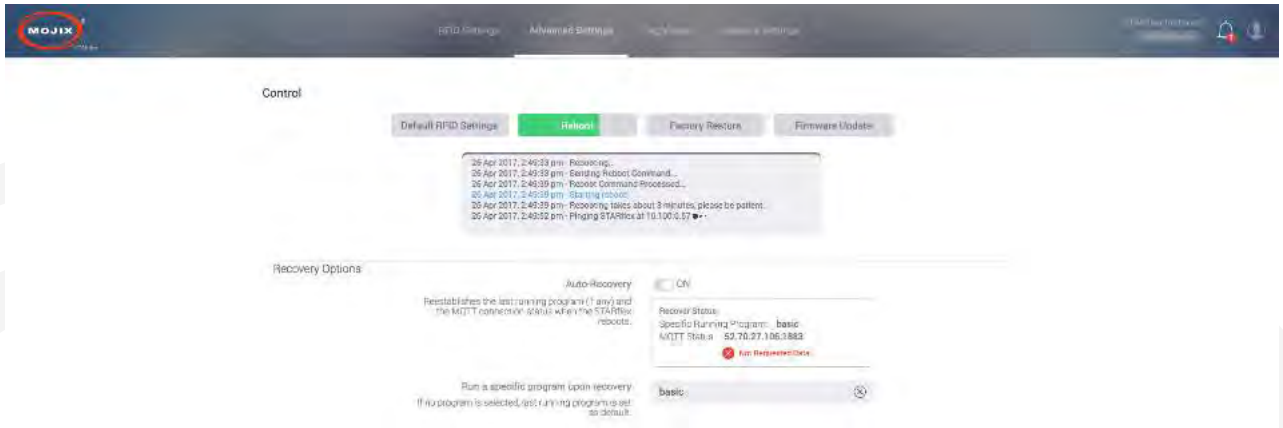
Once this option is clicked and after confirming the action, the application will reset all the RFID settings in both the basic and advanced pages to a known default configuration.

The **Basic** mode default settings are:

- STARflex antenna selection defaults to 4 antennas selected.
- **No eXpanders** enabled.
- 2nd receive antenna set to **Auto.**
- Physical Layer Defaults:
    - Target Group: **A**
    - Session: **S1**
    - Q: **5**
    - LF: **256 kHz**
    - Modulation: **Miller-4**
- Selects enabled and **NO mask**

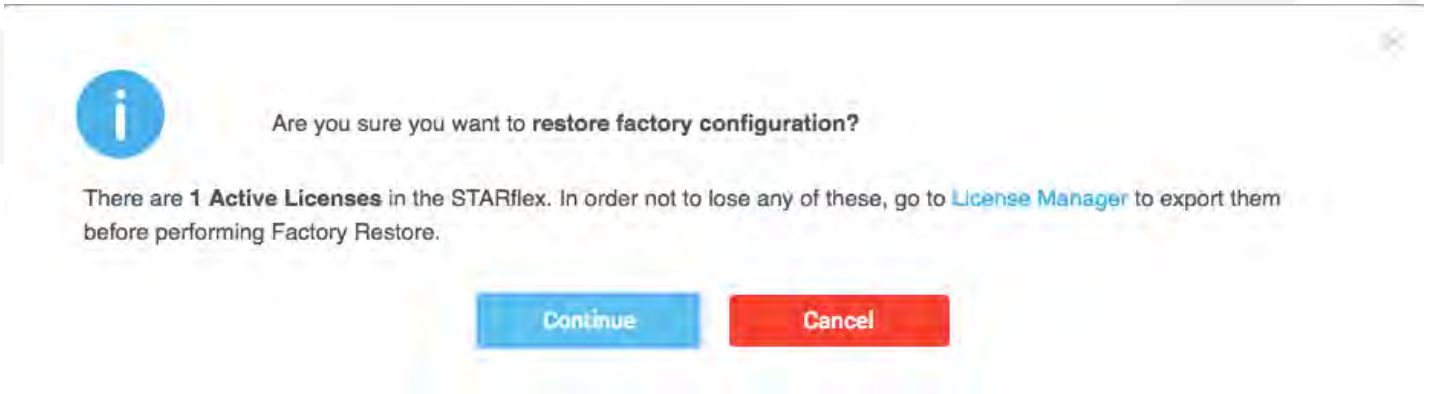
6.1.2 REBOOT

This option allows the user to reboot the STARflex, the result log actions are displayed in the log area below the buttons.



6.1.3 FACTORY RESTORE

This option allows the user to restore the STARflex back to its original configuration (the one given in the manufacturing) including all the default network settings and default name. The log actions are displayed in the log area below the buttons. If licences were aplied the following message will be displayed along with factory restore confirmation message, allowing the user to export the licences.



6.1.4 FIRMWARE UPDATE

Once clicked this option, a new dialog will be displayed asking for the file to update the Firmware. In this new dialog a folder icon is displayed, it will launch the file picker in order to select the corresponding file. Additionally, the option “URL Mode” is available allowing to enter the URL where the file is located and download it to the current machine.
After choosing the file and clicking “Apply”, the current dialog is closed and the application uploads the file, however before the process starts, the RFID program is stopped. Once it is done, the corresponding upgrade process starts and after the process completes, a reboot of the STARflex is done. The notification messages will be displayed in the area below the buttons.

***Note:* All previous configuration will be kept after firmware update**

In IOS devices the “locations” to upload attachments are set up by third party applications, by default only the Photo Album contents are selectable.

By having third party applications such as DropBox, Google Drive, you can have other locations from where you could choose the file for firmware update. We have similar behavior for Android devices.

Works on IOS version 9.0 or higher, you will have to install other third applications for versions earlier than 9.0 in your IOS device.

6.1.5 RECOVERY OPTIONS

When this option is ON it reestablishes the last running program and the MQTT connection status when the STARflex is rebooted or power cycled. An specific program can be selected to run upon recovery from the bottom menu, if none is chosen the last running program before the reboot is set as default.

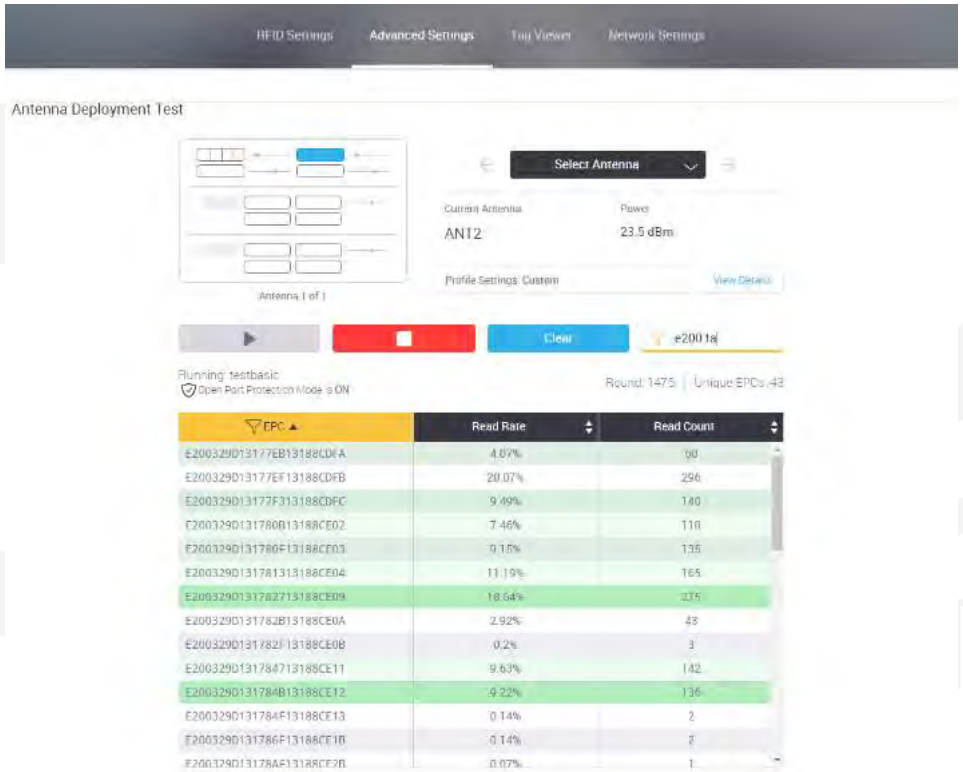
6.2 ANTENNA TEST

The “Antenna Deployment Test” page allows the user to step through the configured antennas in the RFID settings page (refer to Chapter III - RFID Settings) in order to test them one by one and make sure they each can read tags. This process ensures proper continuity of cables and antennas.

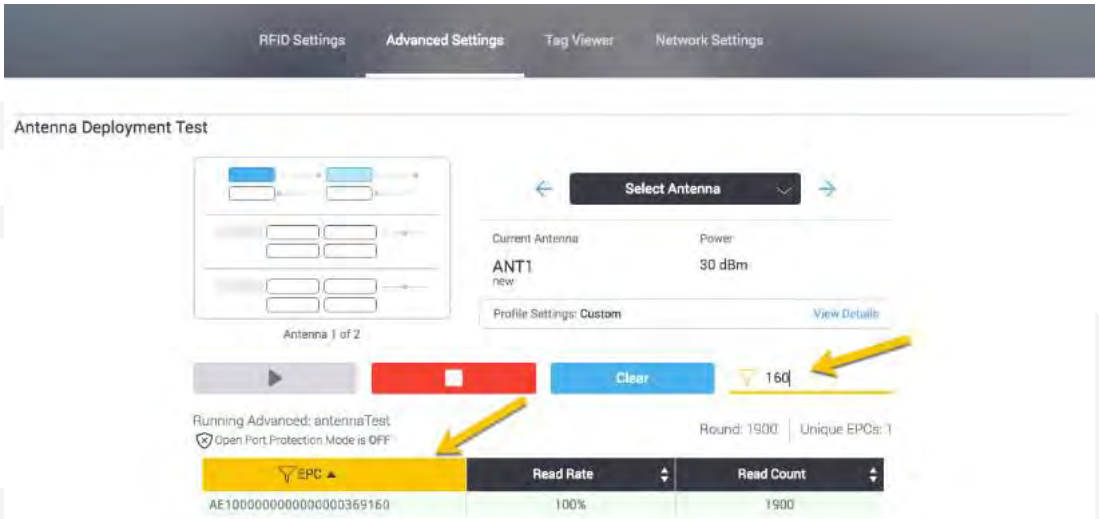
In this page, an scaled RFID Settings scheme is displayed giving an overall view of the configuration showing all the antennas and highlighting the antenna that is tested at the moment. In order to select the antennas there are 2 arrows next to the map which allows to go through all of them, in addition the name and power of the antenna selected are displayed.
A section with the profile settings is available to show and hide by clicking on the “View details” link

Below, the buttons to Start, Stop and Clear the list of read tags are displayed and next to them an “EPC” filter.

A blank space is a logical “or”: Example: e200 fa searches for pattern e200 or fa. Note that We do not use or as logical or.



In addition, the column associated with the filter is highlighted:

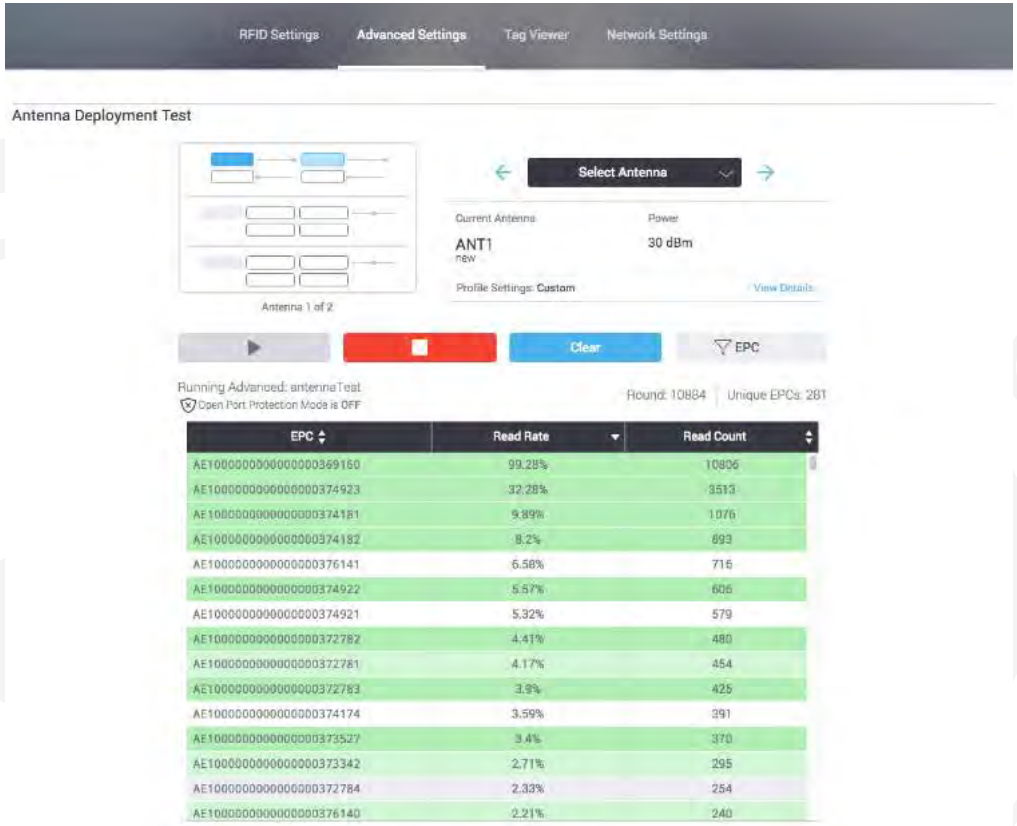


Moreover, the number of Rounds, number of unique EPCs and the name of the program that is currently running are displayed.

At the end of the page a list with the tag reads is available with 3 columns: EPC, Read Rate and Read Count.

If there are no antennas selected in the basic settings page, a message should be displayed at the top of the page. In addition, the map, arrows, name of the antennas, power and the buttons (Play, Stop and Clear) are disabled.

If the program is started from the “Antenna Deployment Test” page, any program running at the moment in the “Tag Viewer” is stopped and right after that the “antennaTest” program (advanced) starts running. However, if the basic program or any other (except antennaTest) is started from the “Tag Viewer”, the Antenna Deployment Test remains stopped.

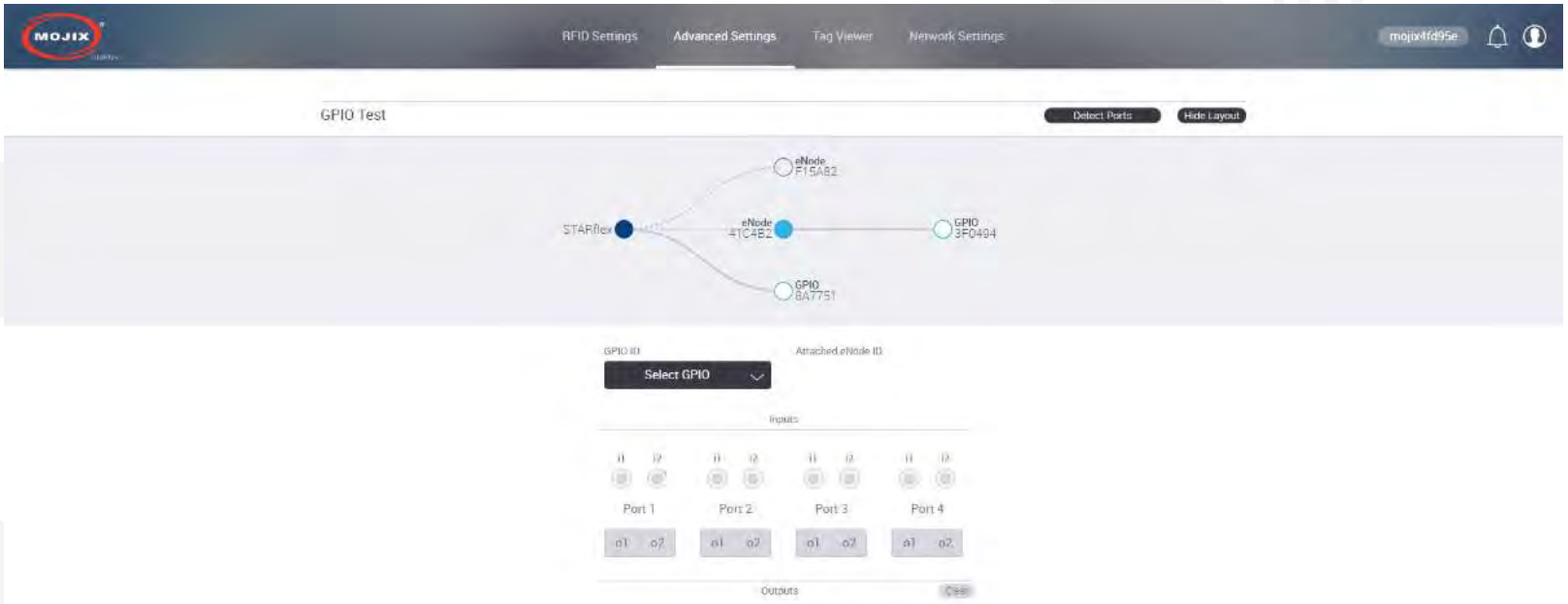

RFID Settings
Advanced Settings
Tag Viewer
Network Settings
Antenna Deployment Test
Select Antenna
Current Antenna
ANT1
new
Power
30 dBm
Profile Settings: Custom
View Details
Antenna 1 of 2
Clear
EPC
Running Advanced: antennaTest
Open Port Protection Mode is OFF
Round: 10884
Unique EPCs: 281
EPC
Read Rate
Read Count
AE100000000000000000369160 99.28% 10806
AE100000000000000000374923 32.28% 3513
AE100000000000000000374181 9.89% 1076
AE100000000000000000374182 8.2% 893
AE100000000000000000376141 6.58% 716
AE100000000000000000374922 5.57% 606
AE100000000000000000374921 5.32% 579
AE100000000000000000372782 4.41% 480
AE100000000000000000372781 4.17% 454
AE100000000000000000372783 3.9% 425
AE100000000000000000374174 3.59% 391
AE100000000000000000373527 3.4% 370
AE100000000000000000373342 2.71% 295
AE100000000000000000372784 2.33% 254
AE100000000000000000376140 2.21% 240

6.3 GPIO TEST

The “GPIO Test” page allows the user to validate the state of connected input devices and to test output devices by triggering the respective output through the interface. Once in the page, the GPIO IDs and eNodes are auto discovered and displayed in a tree showing the current configuration.

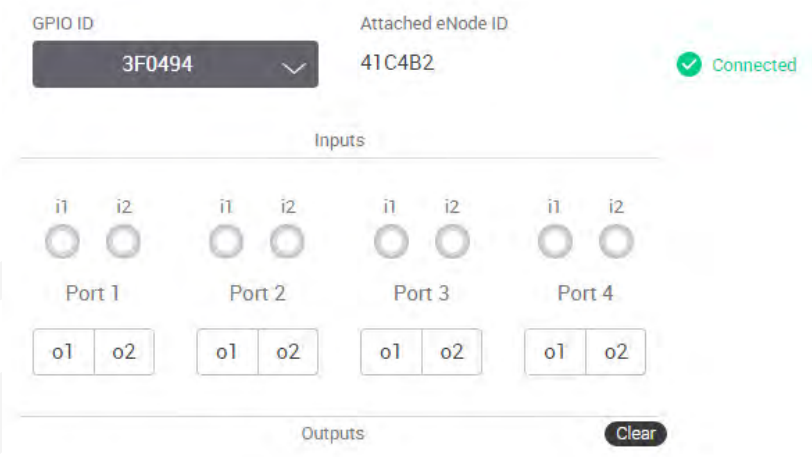
The tree allows the user to select and connect the GPIOs, expand or collapse the eNodes, zoom in or zoom out and move the whole tree. Once a GPIO is selected, the ID and the eNode (if it is attached to an eNode) are populated in the corresponding combo-box and label below. In the same way if a GPIO is selected from the combo-box, the change is reflected in the tree.

A dotted line is displayed from the STARflex node to the eNodes and a straight line from the eNode to GPIO.



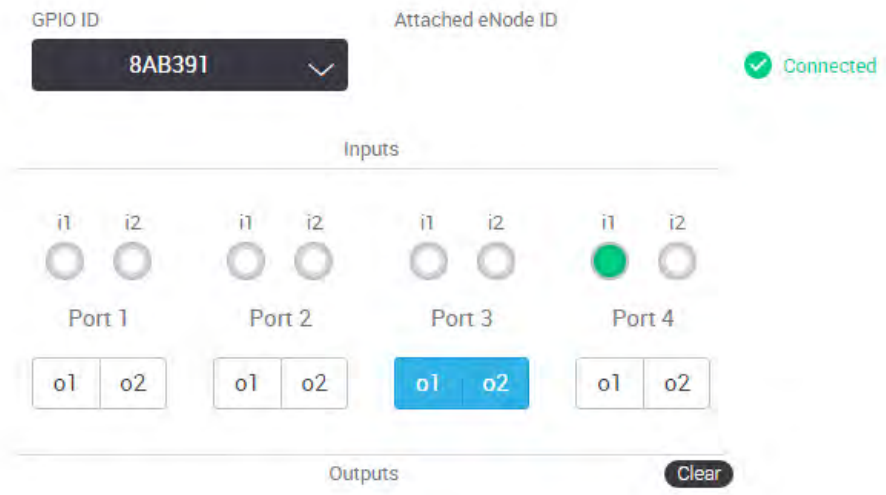
It is possible to select the GPIO IDs from the combo-box or typing in the GPIO ID field and being helped with the auto complete functionality. If the ID is not in the list, it is also possible to add it as new.

Important. *The GPIO ID selected remains connected for the current session.*



A green ok icon is displayed when the entered GPIO ID is valid. In case the ID is invalid or is not connected to the unit, a red X icon is displayed.
If the GPIO is attached to an eNode, the corresponding ID is populated right next to the GPIO ID.

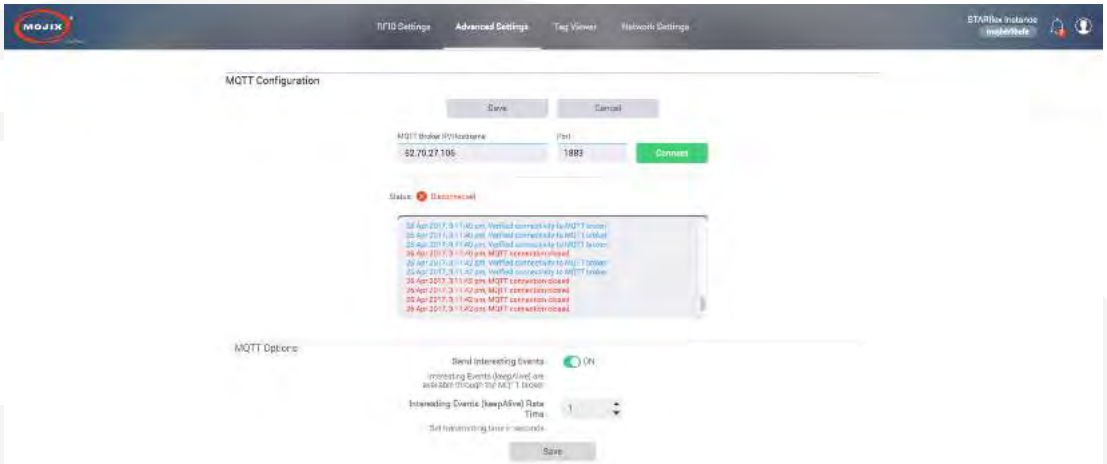
With a valid GPIO ID, the state of the connected input devices is reflected in the corresponding input and port, the output buttons are enabled to trigger the respective output devices through the interface.



If an output device is unplugged from the GPIO and the corresponding button is clicked, a message is displayed.

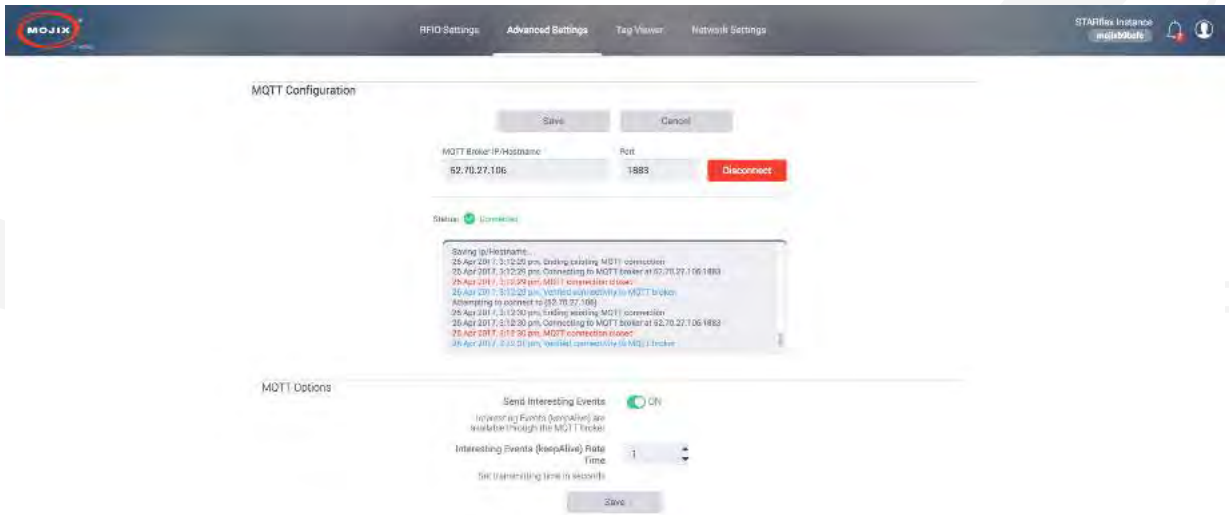
6.4 MQTT CONFIGURATION

The “MQTT Configuration” page allows the user to set up the hostname/IP address, port to connect and test to the MQTT broker and to set up the interesting events keep alive rate .
The “Save”, “Cancel” and “Connect” buttons are enabled once the MQTT broker IP and port are entered.

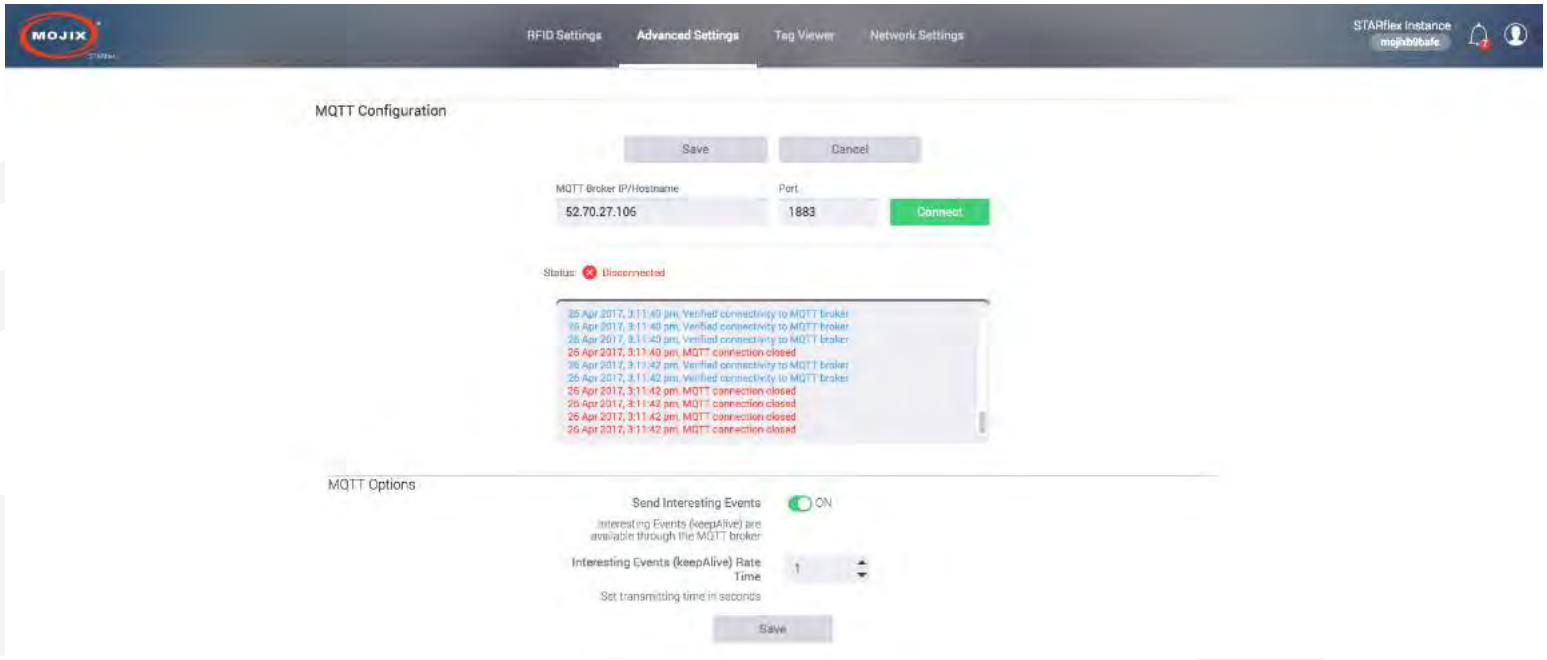


With the “Connect” option it is possible to connect to the MQTT broker without saving the information and with the “Save” option the data to connect to the MQTT Broker is saved.

After the MQTT broker is connected, the label of the “Connected” button turns to “Disconnect” and this option disconnects the STARflex from the MQTT broker.



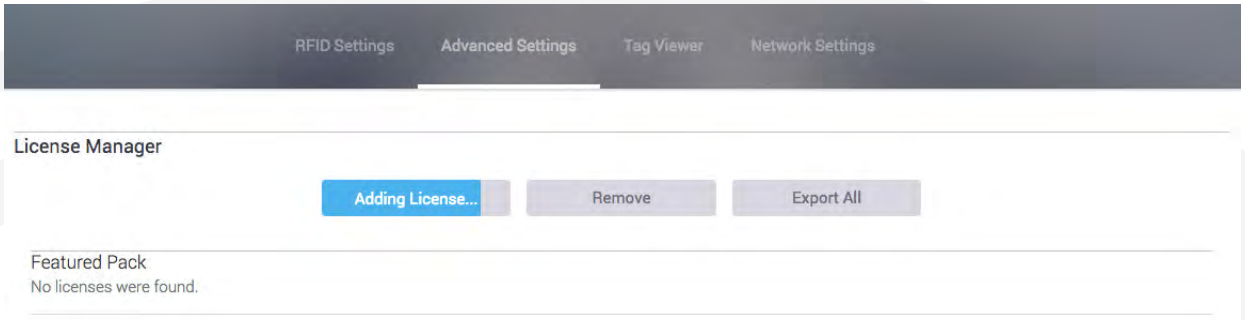
If the connection is successful, the status “Connected” and a green ok icon are displayed, otherwise the status “Disconnected” and a red error icon are shown. In addition, in the rectangular section displayed below, all the MQTT related messages regarding the connection are displayed.



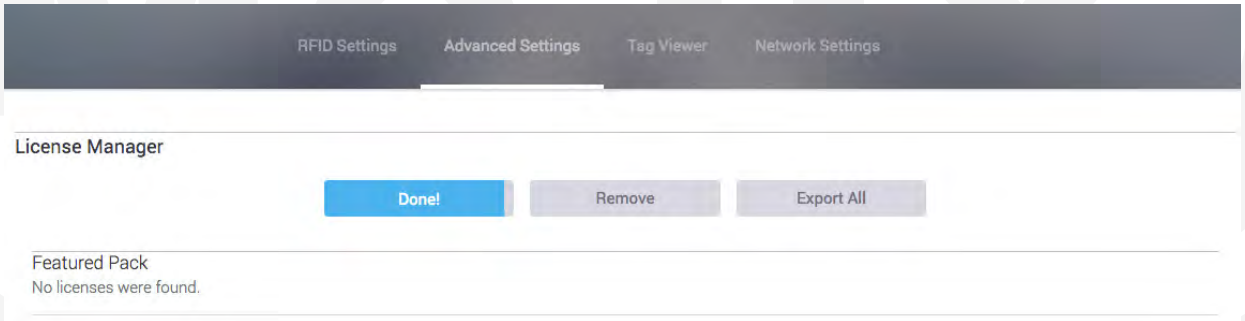
In the MQTT Options section at the bottom if the Send Interesting Events is set to ON it will keep sending the Interesting Events (keepAlive) at a rate time in seconds that can be set below the ON/OFF button.

6.5 LICENSE MANAGER

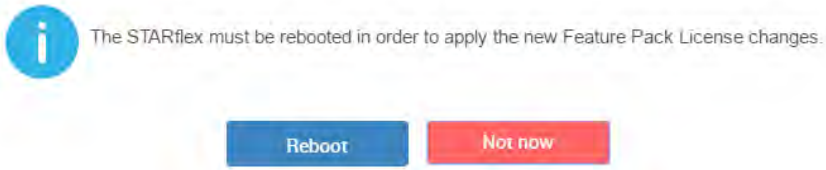
The “License Manager” page allows the users to add, remove or export licenses.
To upload a new license click on “Add License” button, with the file picker select the corresponding license and apply. A loading indicator will appear while the license is uploading:



The license will be successfully uploaded when the button changes to **Done**!

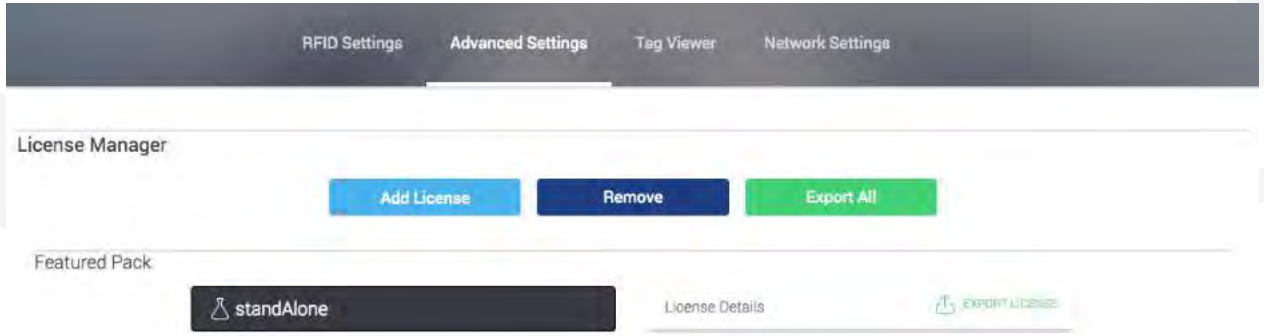


Click on the **Reboot** button in order to apply the new License:

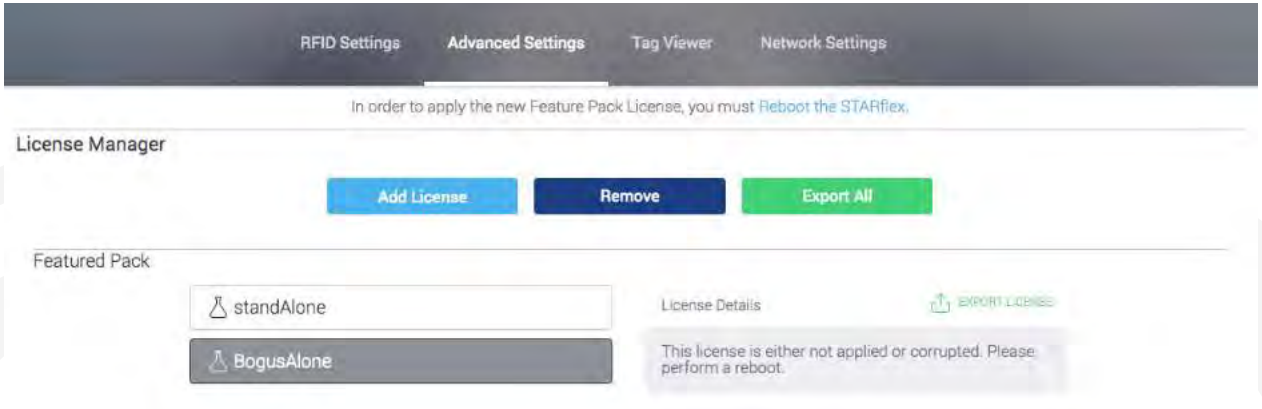


The reboot process will be automatically displayed:

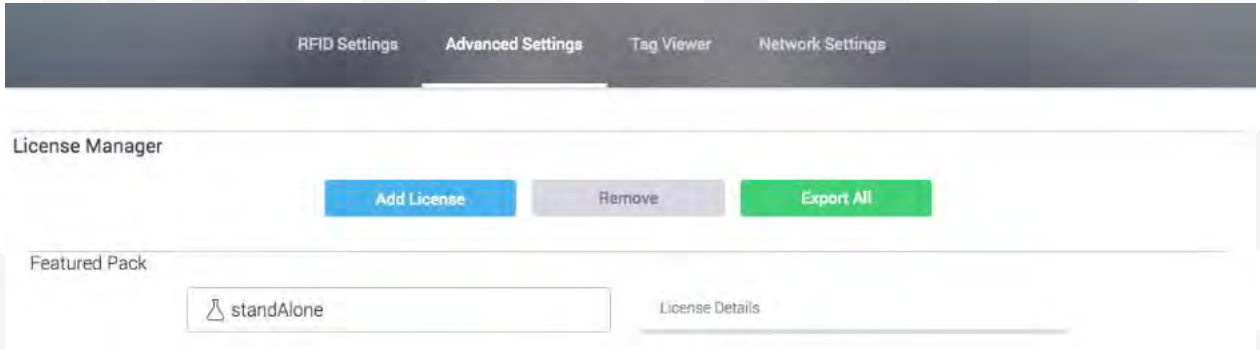
After the reboot is completed the license is displayed as available. The feature details can be displayed by clicking on it.



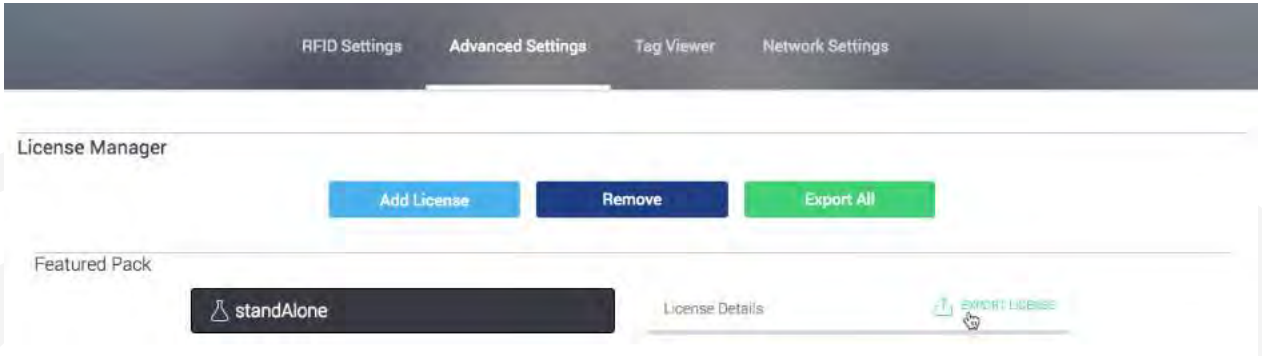
Invalid licenses are listed and visible however these are disabled.

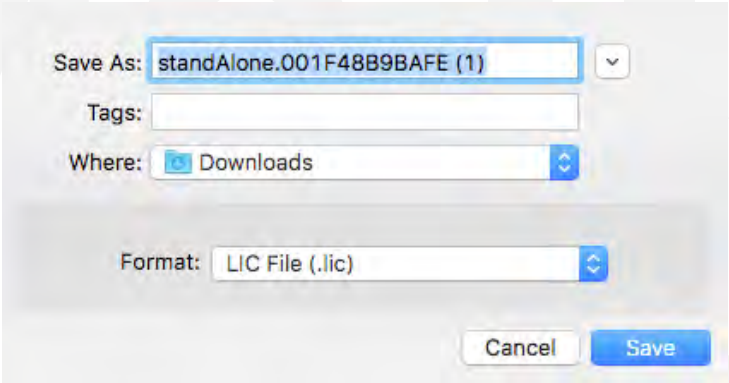


To remove a license click on it and click on “Remove”, it remains displayed but not available, a reboot is required for valid licenses in order to remove them completely.

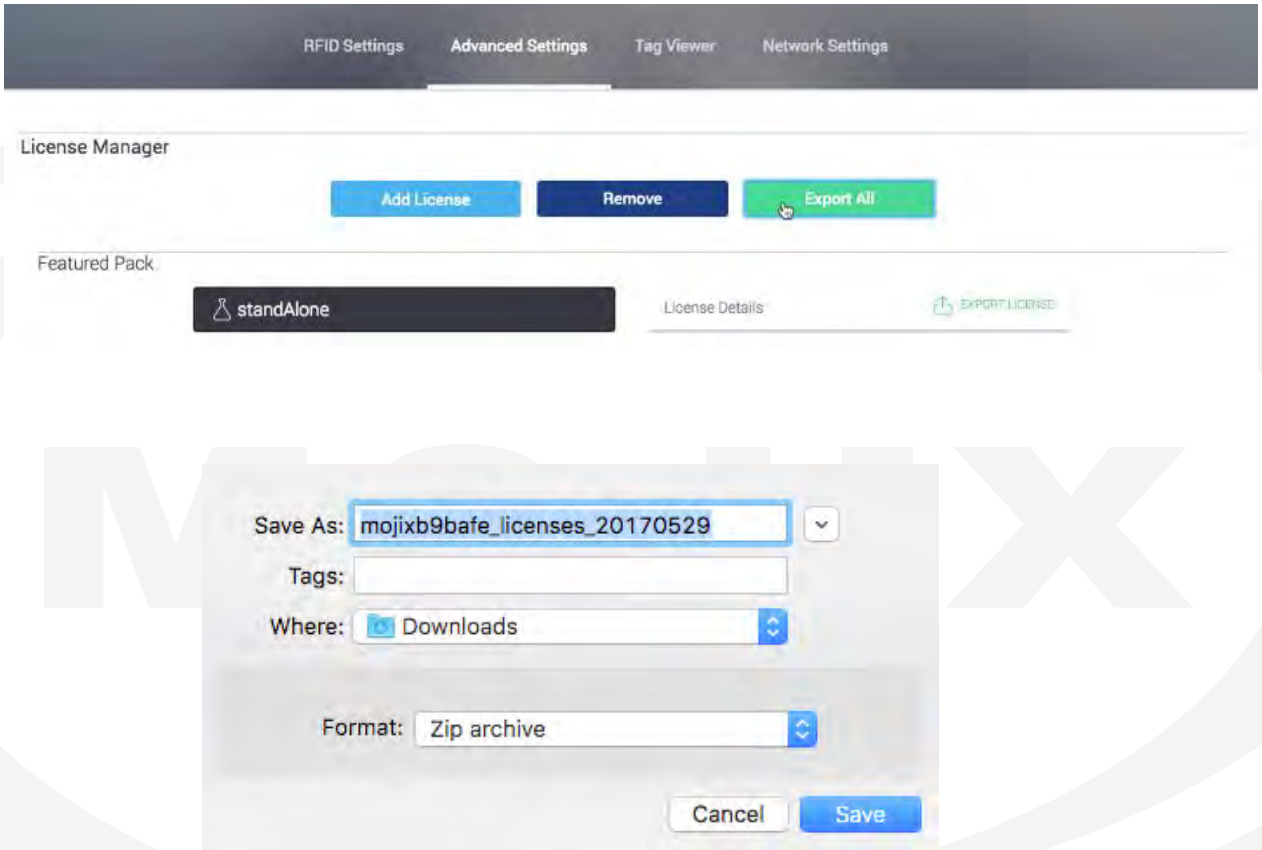


To export a licence click on it and click on “Export Licence”, a prompt will appear, select the location to save the file and click on save.





To export all licences click on the ”Export All” button, a prompt message will appear, select the location to save the file and click on save.

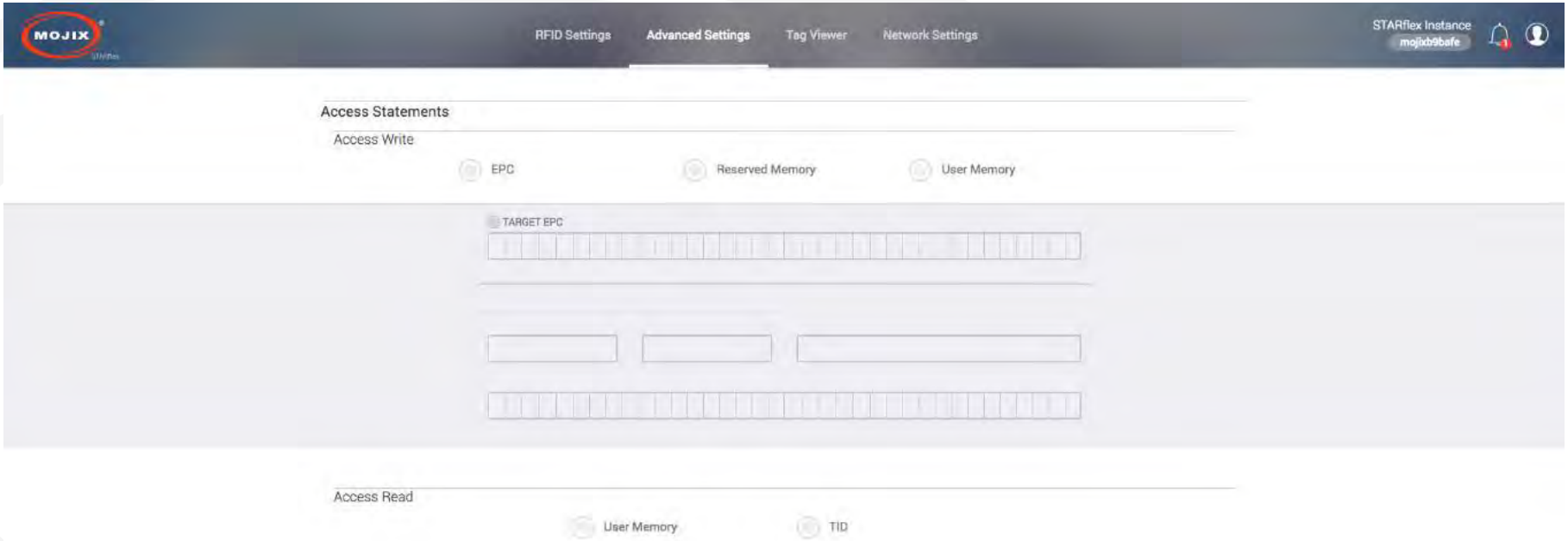


NOTE: *In* **IOS devices** *the “locations” to upload attachments are set up by third party applications, by default only the Photo Album contents are selectable.*

By having third party applications such as DropBox, Google Drive, you can have other locations from where you could choose the file for license manager. We have similar behavior for Android devices.

6.6 ACCESS STATEMENTS

The Access Statements page allows the user to perform additional access write and access read actions to the tags, it is divided into two sections:

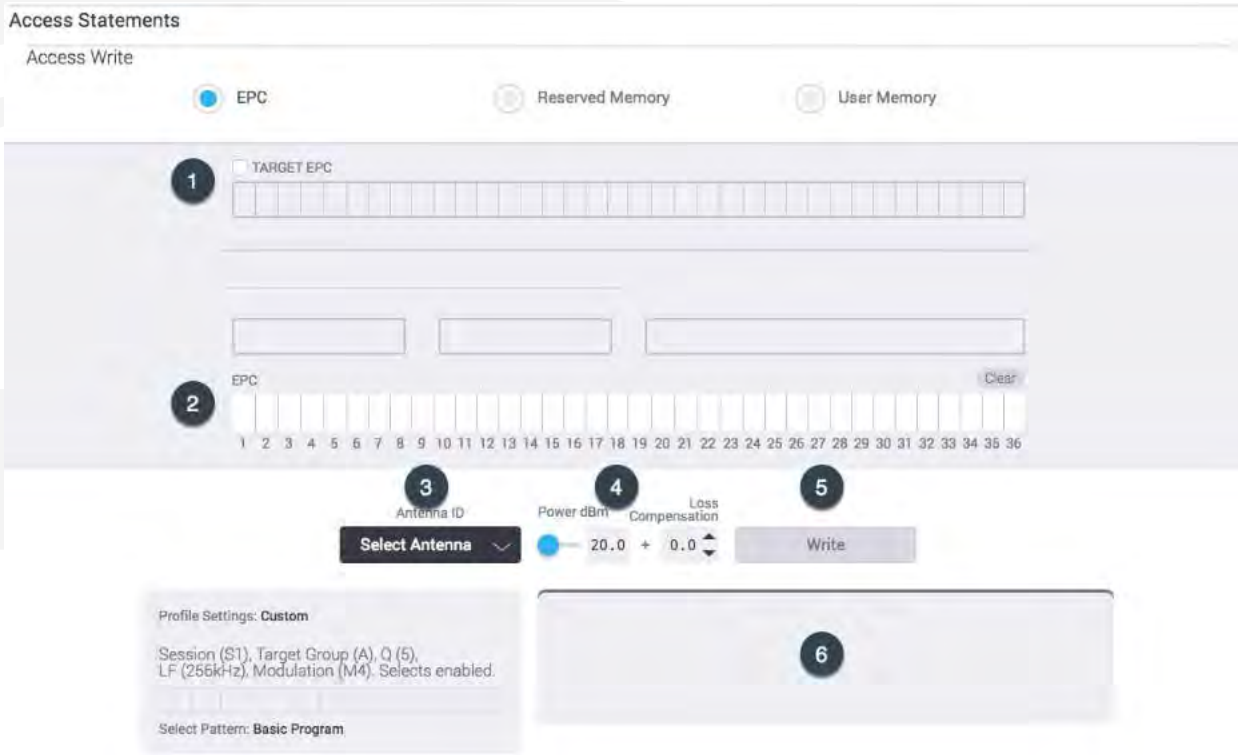


6.6.1 ACCESS WRITE

There are three write options in this section, EPC, Reserved Memory and User Memory

EPC

This option lets the user select one or more tags and re write it with a different number in hexadecimal.

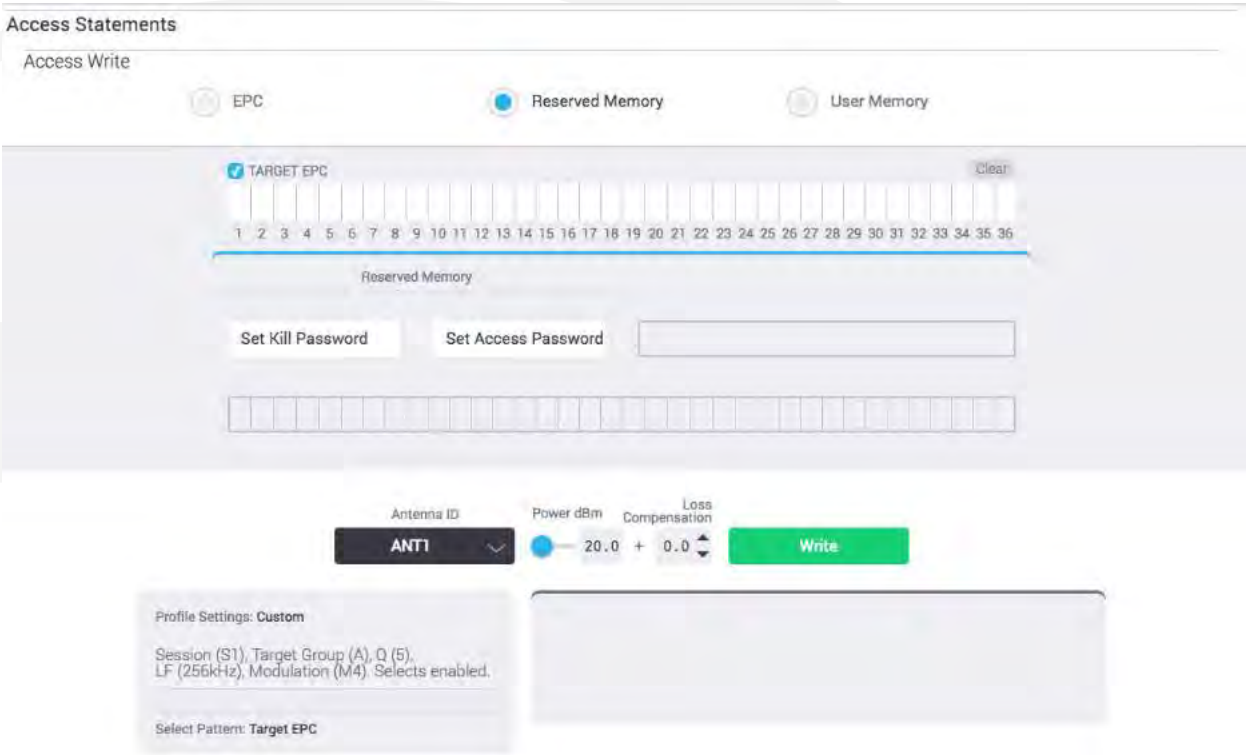


Where:

1. TARGET EPC: Enter the target EPC number to be modified from the tag.
2. EPC: Enter the new number to be written.
3. Antenna ID: Select the antenna to be used for the writing process.
4. Power dBm: Set the power level in dBm for the selected antenna.
5. Write: Click this button to start the writing process (please be aware that all nearby tags with the same EPC number will be overwritten with the new number).
6. The process success or fail will be displayed in this field.

Reserved Memory
This option lets the user set a Kill Password and an Access Password.

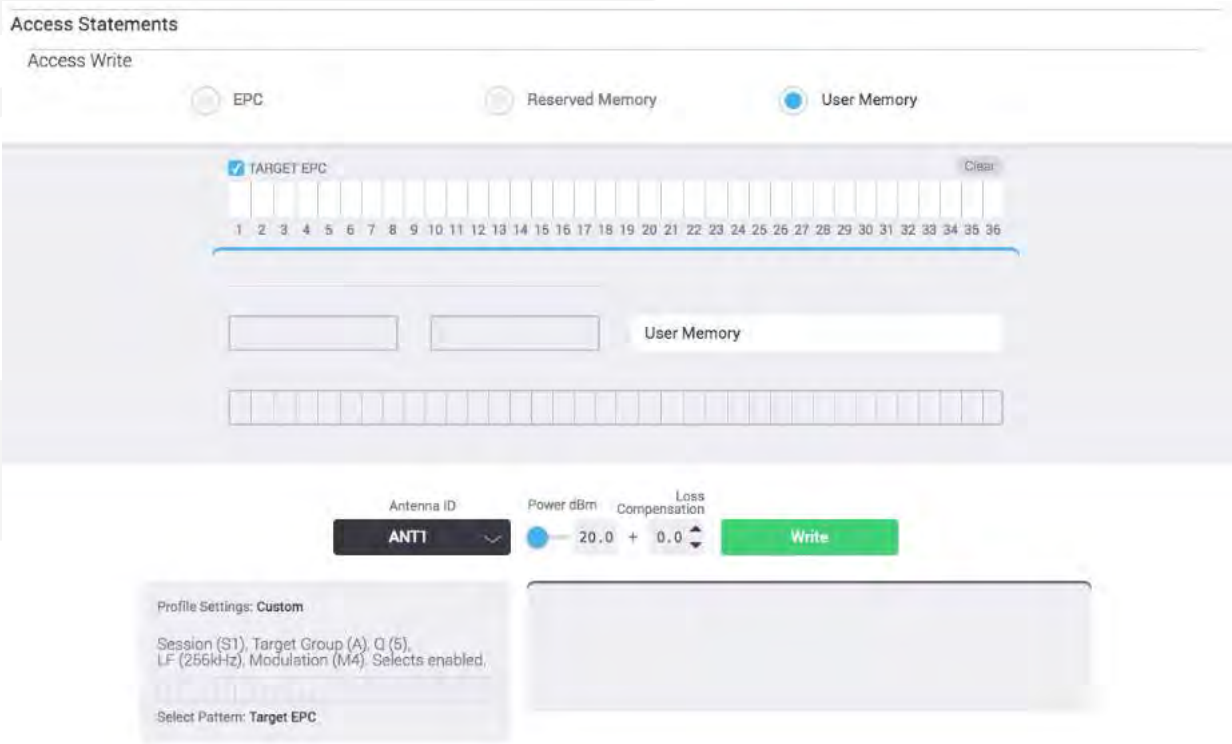
1. Kill Password: This option sets a password for disabling the tag (non responsive tag) and prevent it from being read.
2. Access Password: This option sets a password to prevent unauthorized reading and writing of the tag's registry.



STARflex

User Memory

This option lets the user write additional information to the user memory bank using hexadecimal code.

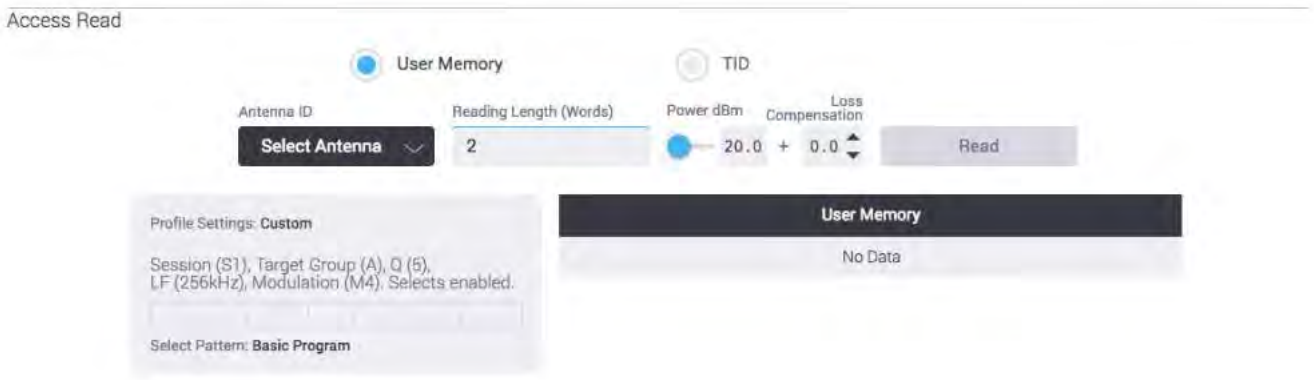


6.6.2 ACCESS READ

There are two options in this section User Memory and TID.

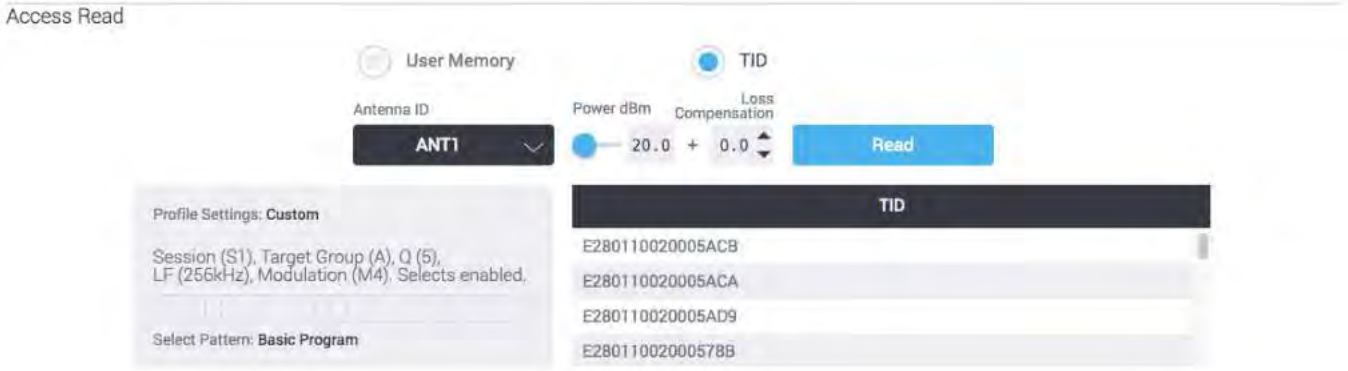
User Memory

This option lets the user read any additional information stored in the tag's user memory.



TID

This option lets the user read manufacture stored unique tag ID number.



APPENDIX

FCC Notice, STARflex, eNode and TMA-2000

CAUTION: To comply with FCC RF exposure compliance requirements, a separation distance of 20 cm must be maintained between the antenna of this device and all persons.

WARNING: This equipment has been tested and found to comply with the limits for Class A digital device pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction's manual, may cause interference to radio communications. Operation of this equipment in a residential area is likely to cause interference in which case the user will be required to correct the interference at his own expense. 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 Mojix Professional Services organization.

In order to ensure compliance with FCC regulations, shielded and grounded cables must be used with this equipment. Operation with non-approved equipment or unshielded cables is likely to result in interference to radio and TV reception. The user is cautioned that changes and modifications made to the equipment without the approval of the manufacturer could void the user's authority to operate this equipment.

COMM
POWER
GPIO
ANT 4
ANT 3
ANT 2
ANT 1