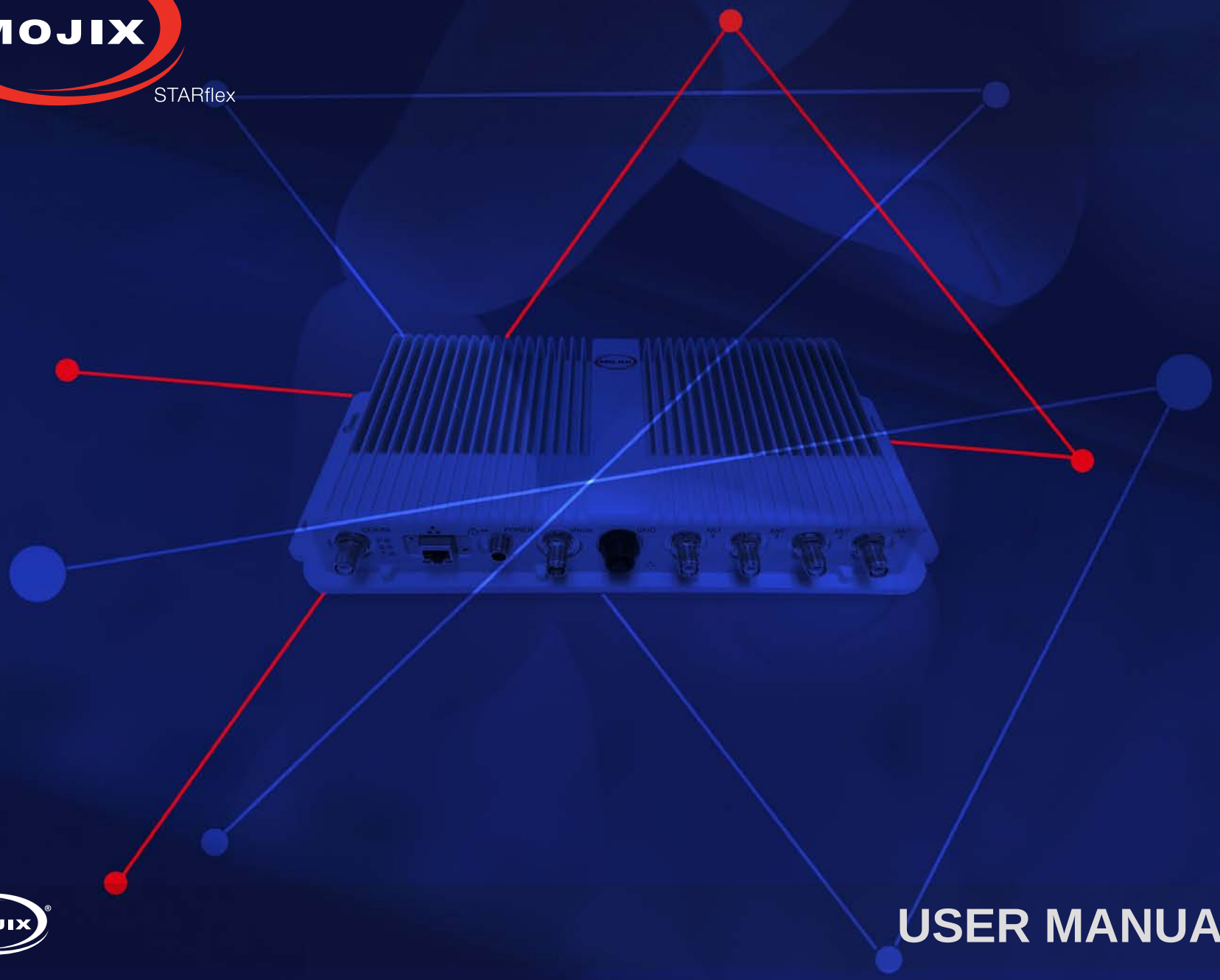
MOJIX®

STARflex



USER MANUAL

1 CHAPTER I: INTRODUCTION

1.1 OVERVIEW 4
1.2 KEY CONCEPTS 6
1.3 BROWSER REQUIREMENTS 6
1.4 MOBILE REQUIREMENTS. 6

2 CHAPTER II: BASICS

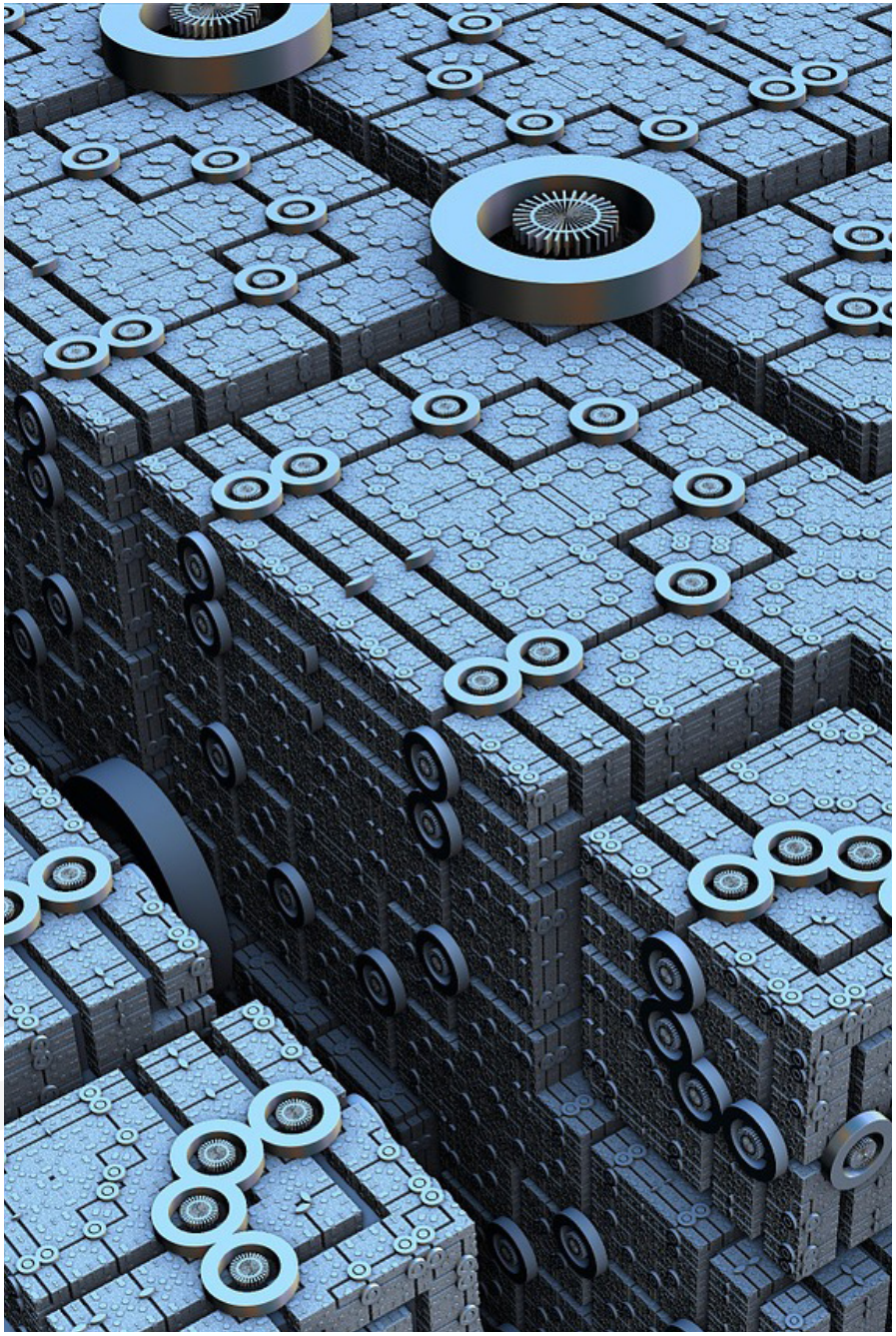
2.1 QUICK START 7
2.1.1 ACCESSING THE STARFLEX WEB INTERFACE . 7
2.1.2 “PHONE-HOME” REGISTRATION 8
2.1.3 HOME PAGE 17
2.1.4 LOGGING INTO STARFLEX 23
2.1.5 ABOUT. 26
2.1.6 SETTINGS. 30
2.1.7 CLIENT LIST 35
2.1.8 LOGGING OUT OF STARFLEX 37
2.1.9 BASIC MODE 38
2.1.10 ADVANCED MODE 41

3 CHAPTER III: RFID SETTINGS

3.1 RFID SETTINGS 55
3.1.1 AUTO DISCOVERY. 57
3.1.2 ANTENNAS 58
3.1.3 ENODE 1 - ENODE 2 58
3.1.4 PROFILES. 59
3.1.5 2ND RECEIVE ANTENNA MODE 60
3.1.6 PHYSICAL LAYER SETTINGS 60
3.1.7 PATTERN 61
3.1.8 BASIC PROGRAM RUNNING. 62

4 CHAPTER IV: TAG VIEWER

4.1 TAG VIEWER 63



5 CHAPTER V: NETWORK SETTINGS

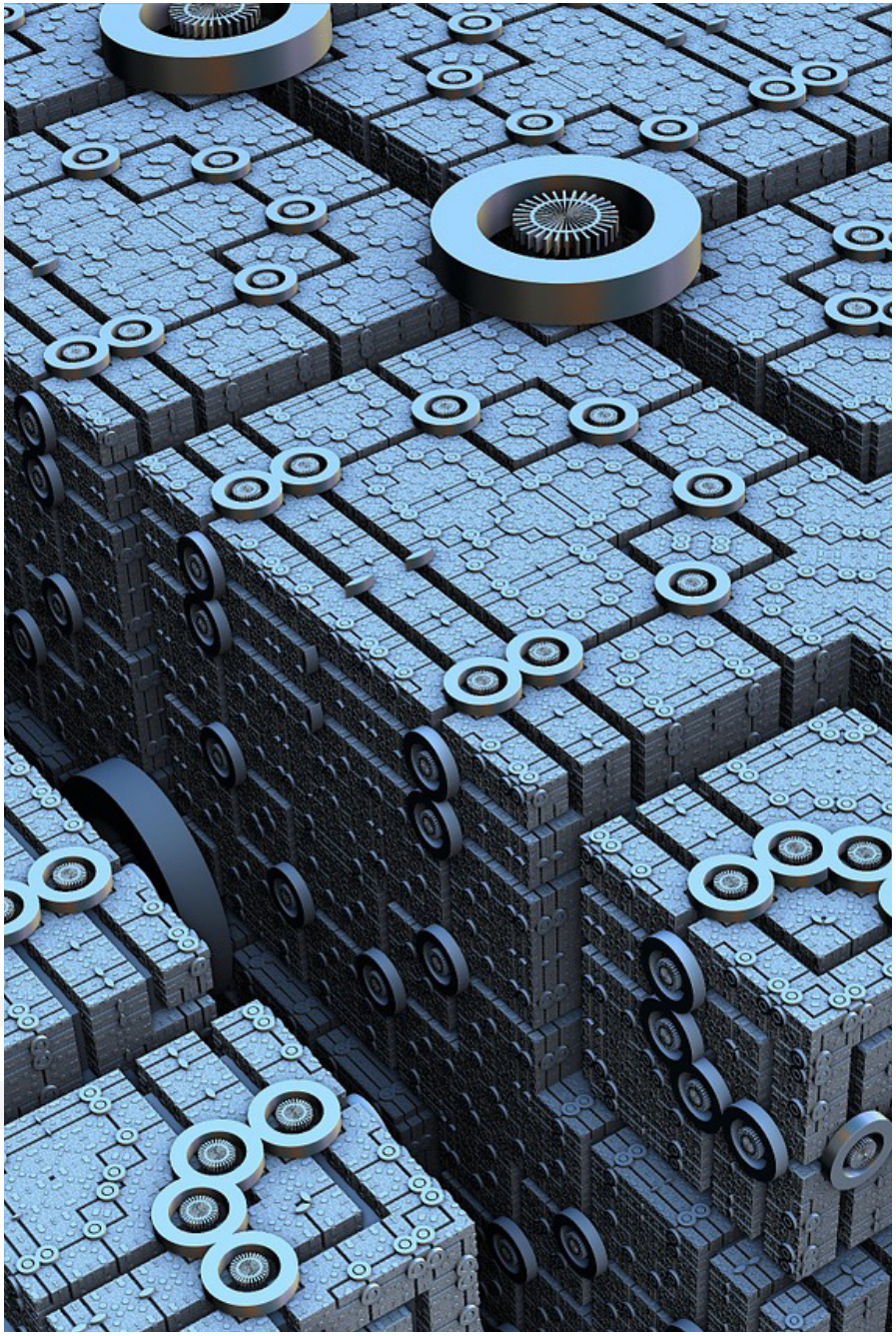
5.1 NETWORK SETTINGS 72

6 CHAPTER VI: CONTROL

6.1 CONTROL 75
6.1.1 DEFAULT RFID SETTINGS 76
6.1.2 REBOOT 77
6.1.3 FACTORY RESTORE 77
6.1.4 FIRMWARE UPDATE 78
6.2 ANTENNA TEST 79
6.3 GPIO TEST 82
6.4 MQTT CONFIGURATION 85
6.5 LICENSE MANAGER 87

APPENDIX

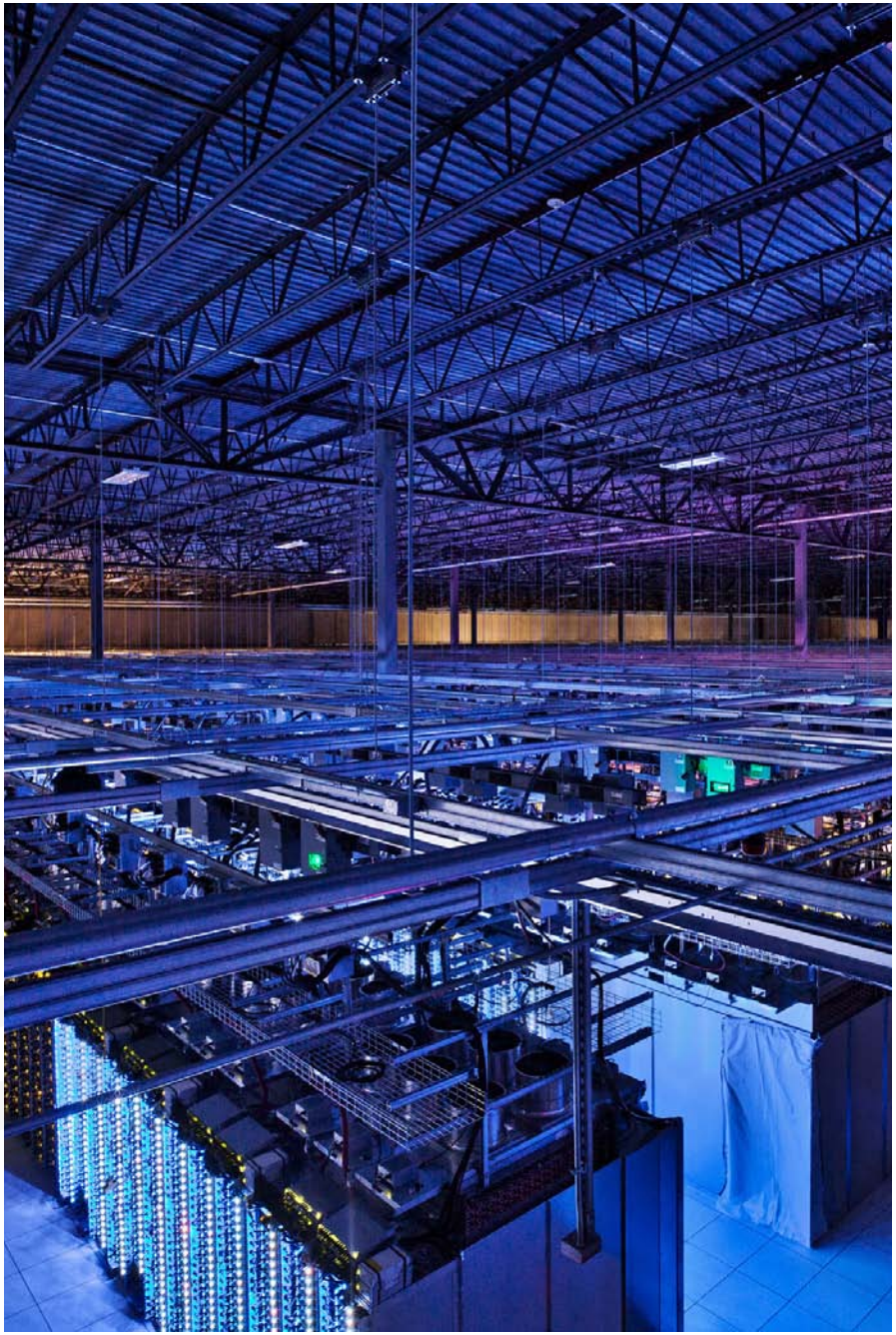
FCC Notice, STARflex and eNode 90



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

Note: STARflex should be installed by Mojix trained professionals familiar with radio frequency equipment and regulatory requirements. To maintain regulatory compliance, use only antenna and cable supplied with the unit or approved by Mojix, and ensure that output power does not exceed regulatory limits.

Caution: To comply with radio frequency exposure compliance requirements, a separation distance of 20 cm must be maintained between reader antennas and all persons.

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 BROWSER REQUIREMENTS

For best results, Mojix recommends the most recent version of Chrome.

1.4 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.

To access the Web interface, specify the following URL in your Web browser: http://169.254.y.z

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

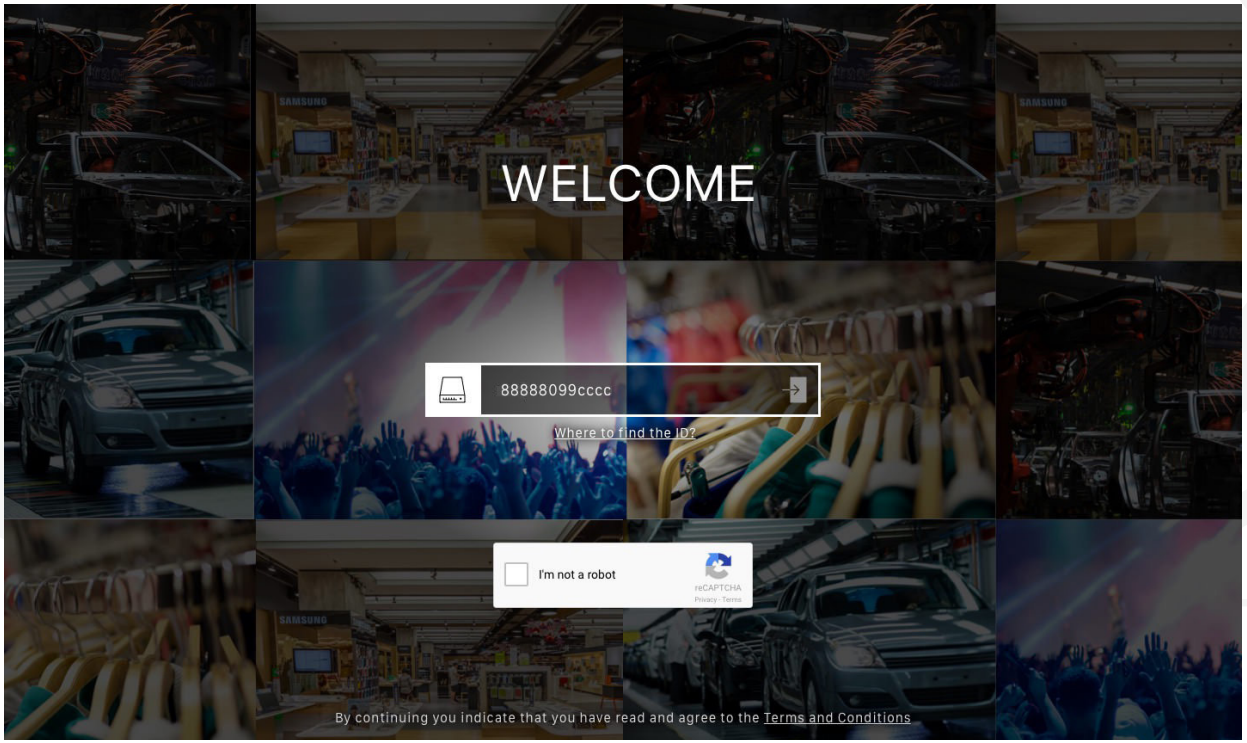
The STARflex is preconfigured to self-register with the Mojix Vizix cloud application if the unit is able to connect to the Internet. The purpose of this registration is to enable users to have a simplified, cloud managed solution for managing STARflex readers. Vizix provides the capability to bring up a STARflex reader and process RFID tag read data in a matter of minutes.

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

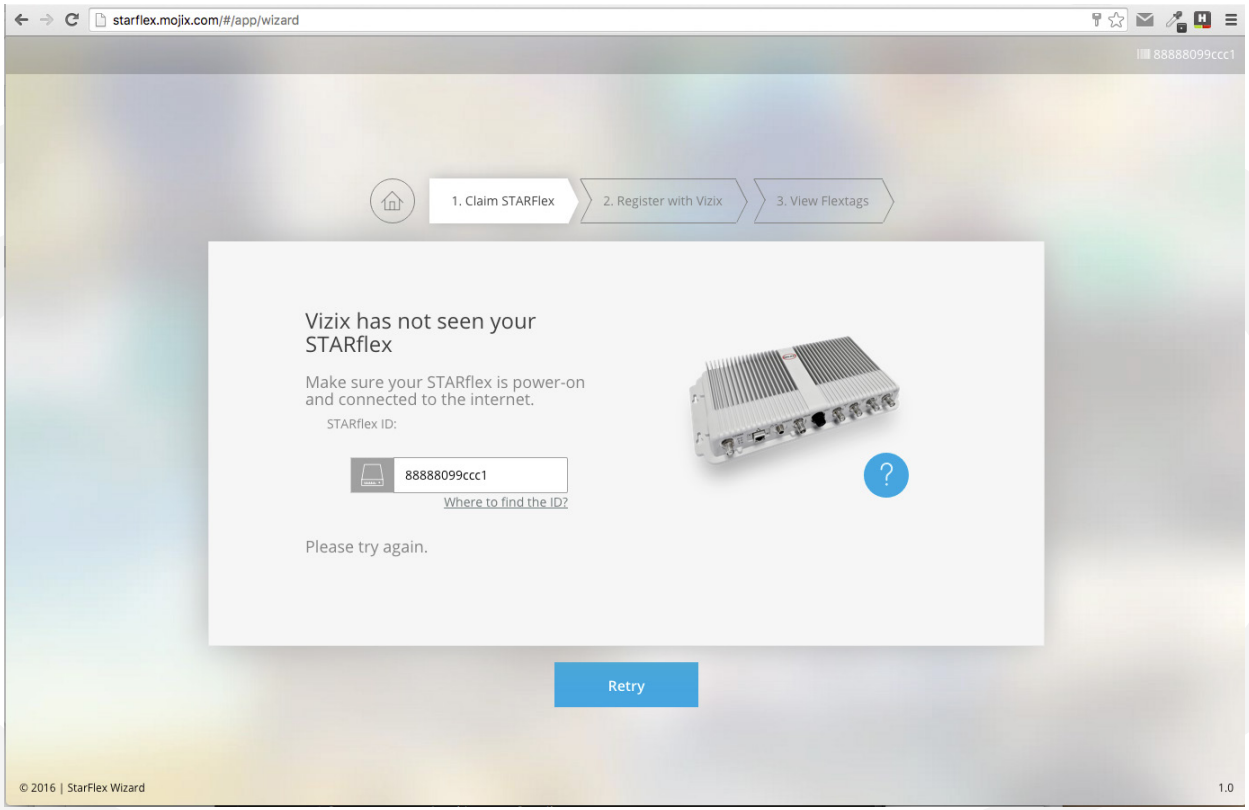
In a browser window go to the Registration Wizard address and the login page will be shown. To login, it is necessary to enter the serial of the STARflex device (already registered in ViZix), this serial should be the same unique code of the device which could be its barcode (usually located at the back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



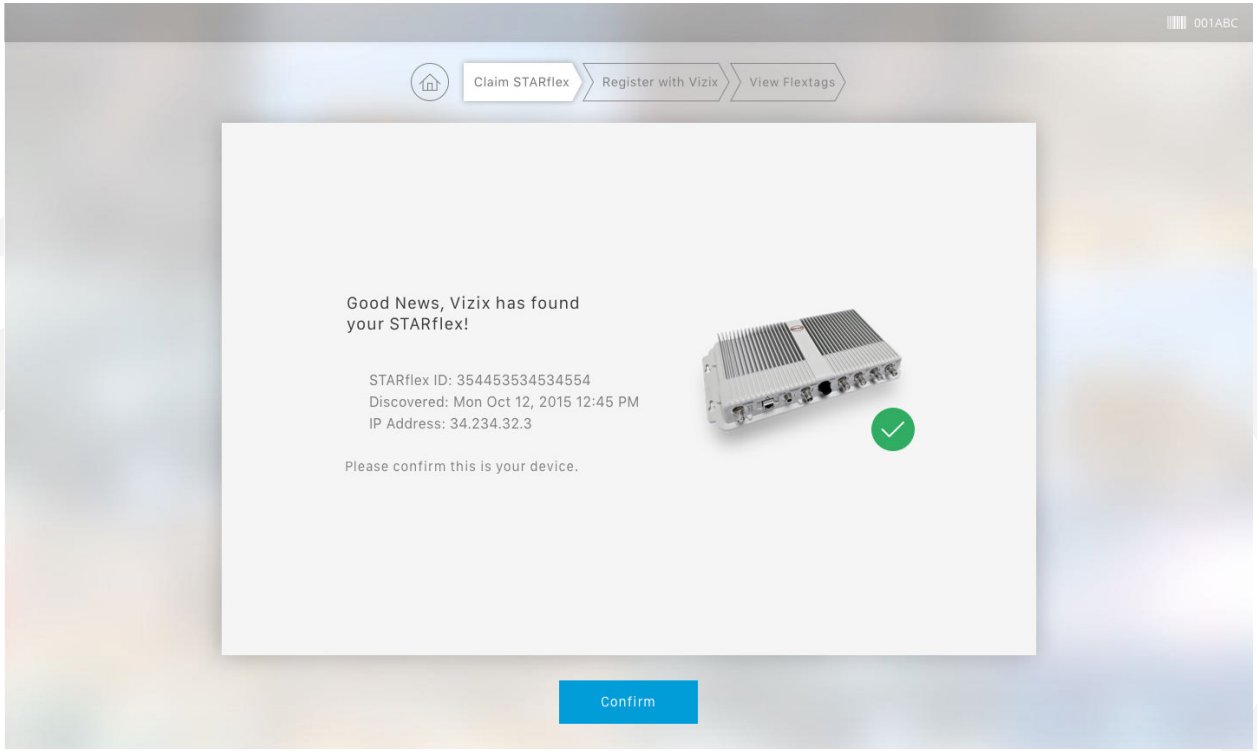
Enter the serial with which the device is registered in ViZix in the **ID/Serial Number** field, check the I’m not a robot captcha, complete its challenge and click on the left arrow of the field to start the wizard.

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.

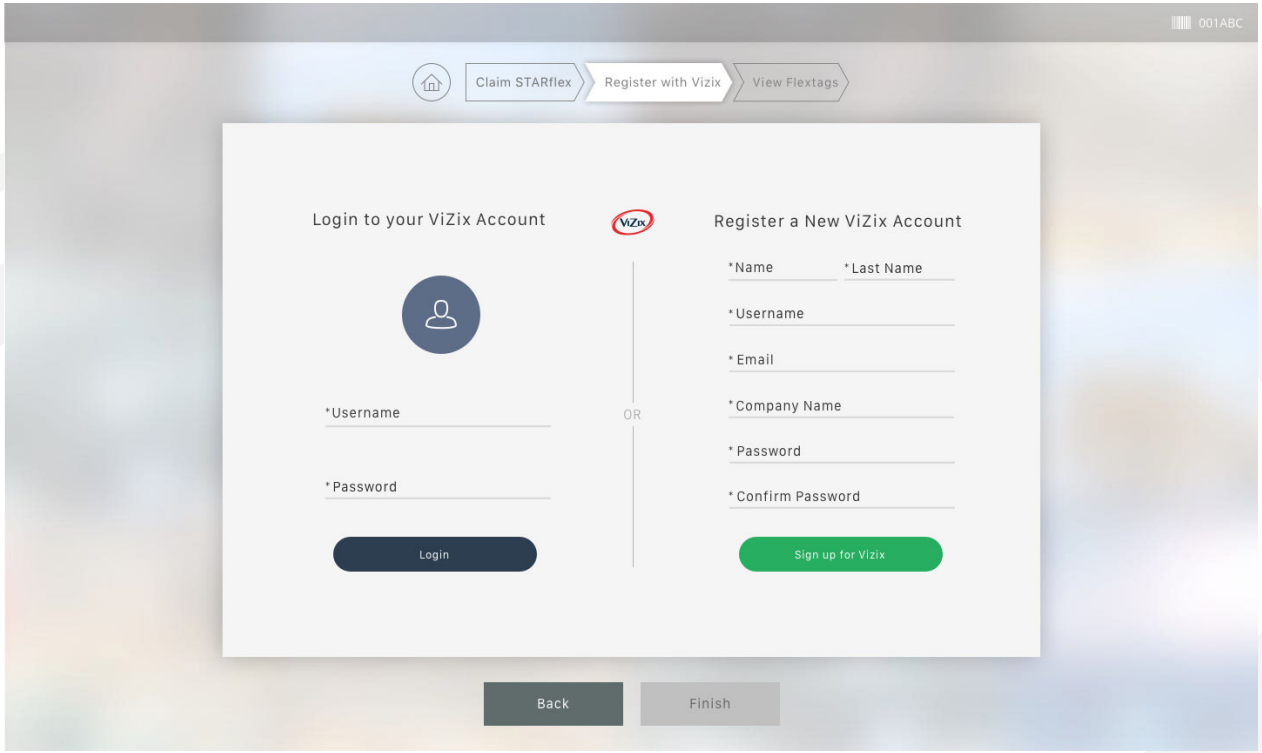


If the entered serial is correct, then the following window will be shown in the first step of the wizard:

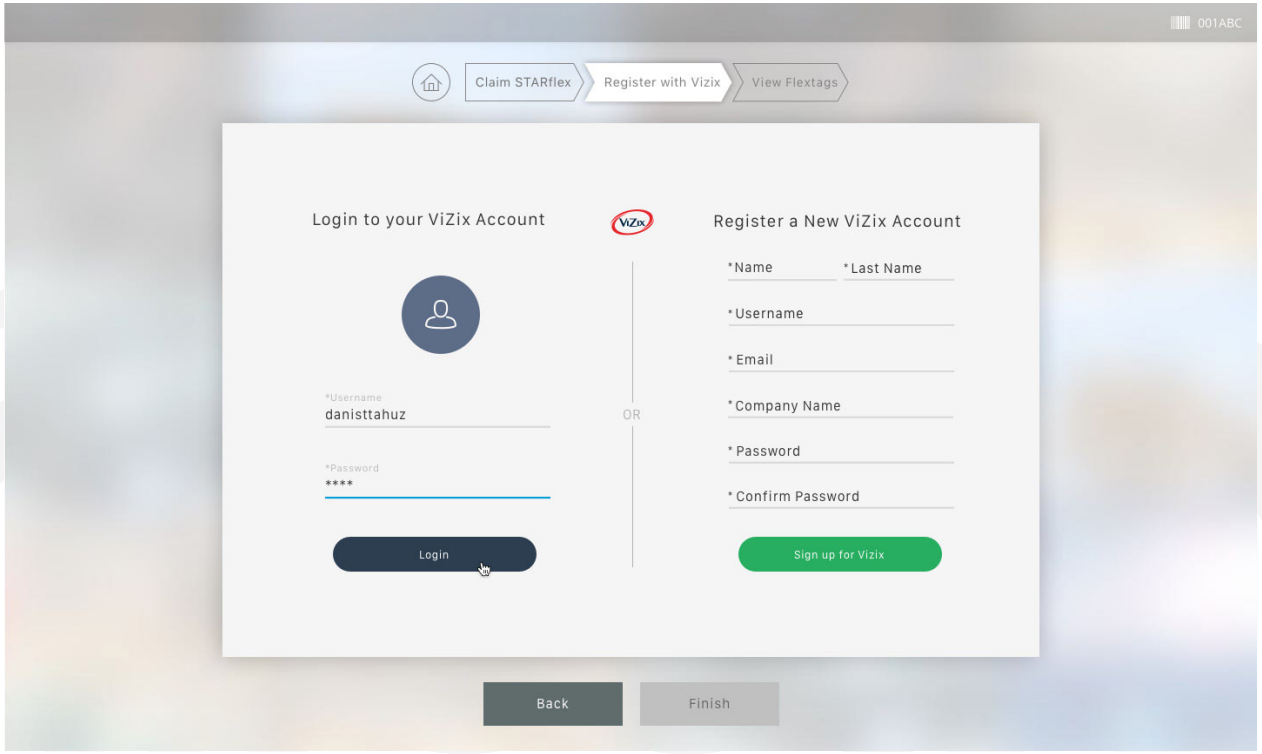


Register with ViZix

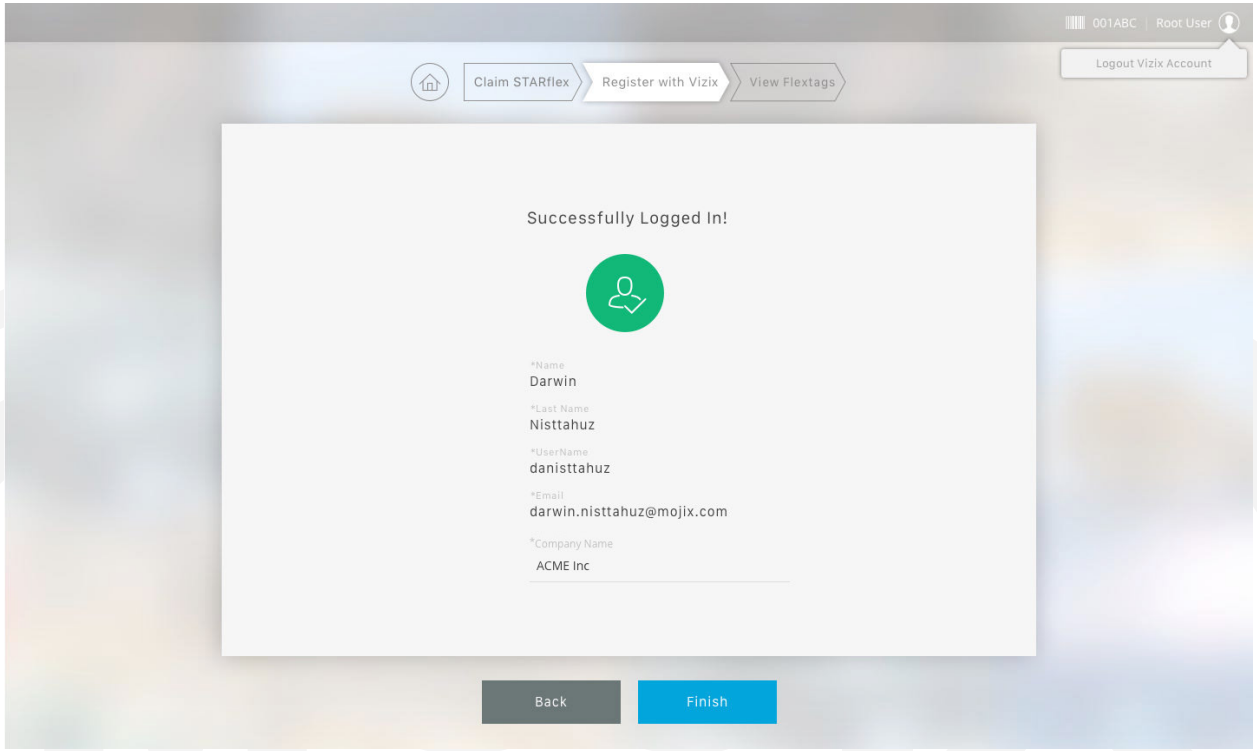
To claim the device it is necessary to have a user registered in the ViZix platform. In the second step of the registration there are two options to connect to ViZix; the first one is using an already registered user in ViZix and the second is to register to ViZix by creating a new account.



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.

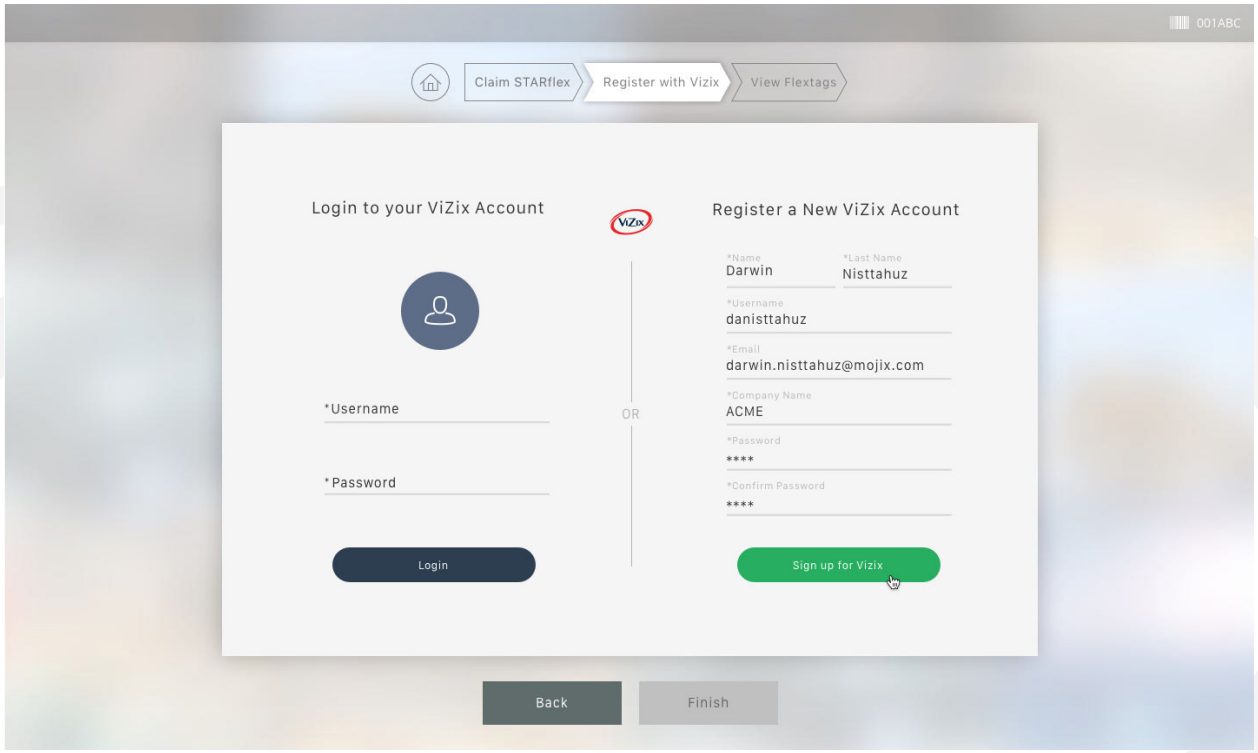


If the account exists in ViZix, the information of the ViZix user, his/her name, last name, username, email and the company name will be shown.



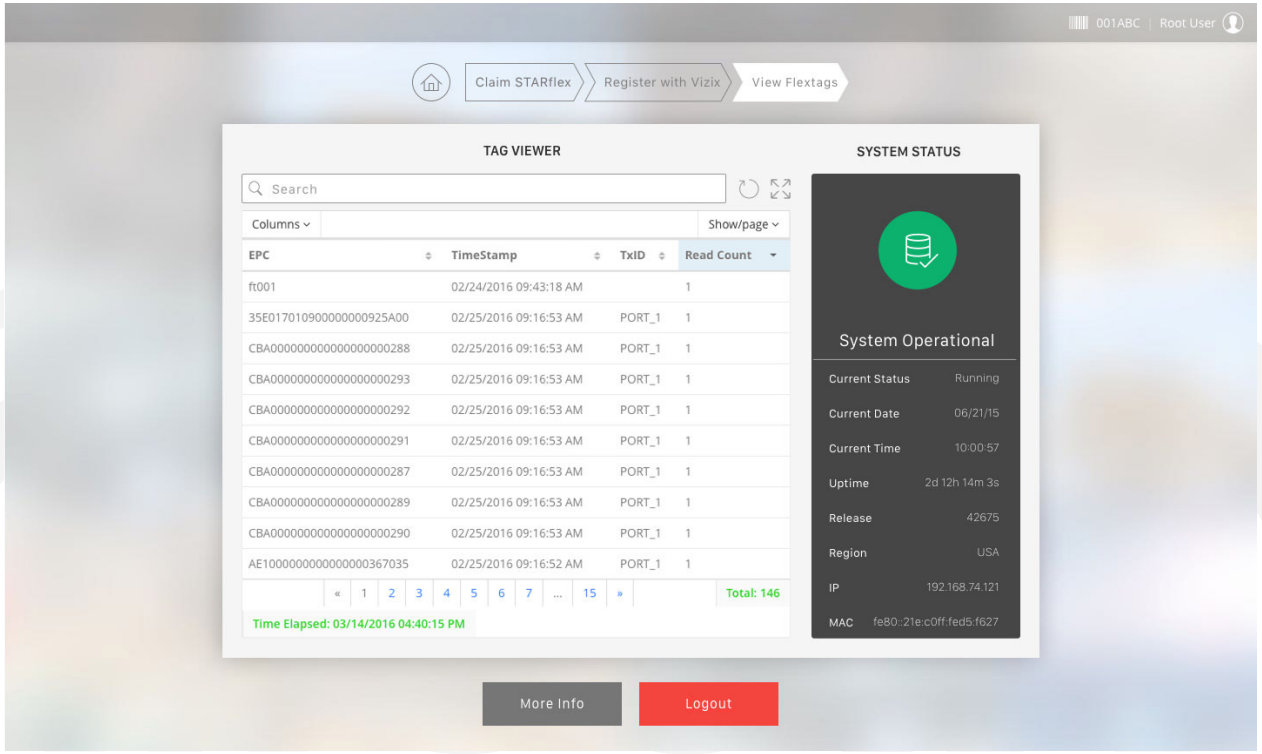
Click on Finish to go to the final step.

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

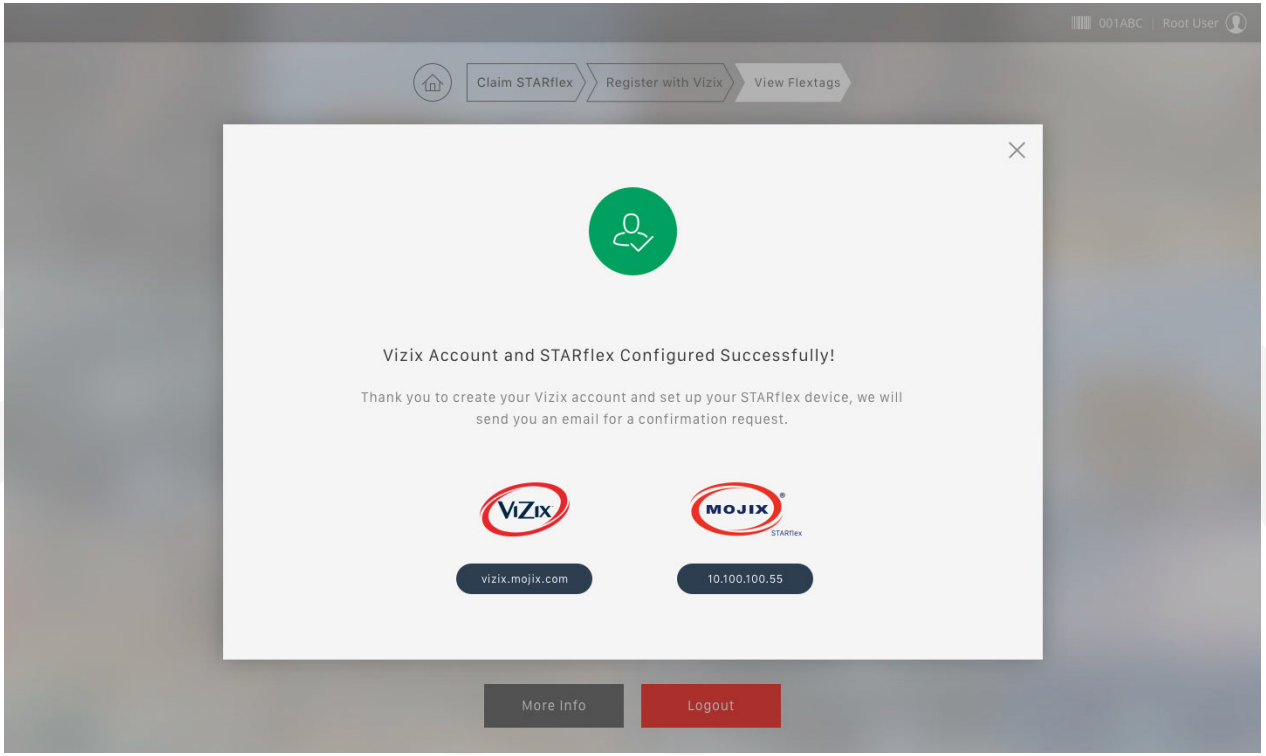


View Flextags

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.

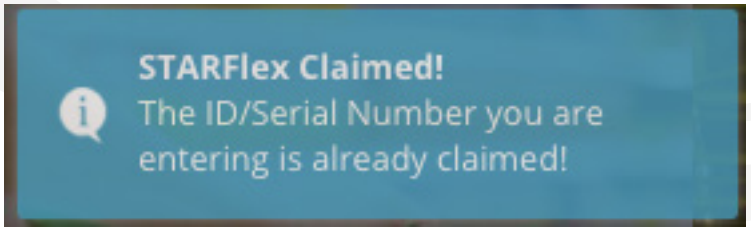


Click on More Info to open the window with the message indicating that the ViZix account and STARflex configured successfully. This window has two options to continue to the ViZix console (at the left) or go to the micro stack console of STARflex (at the right).



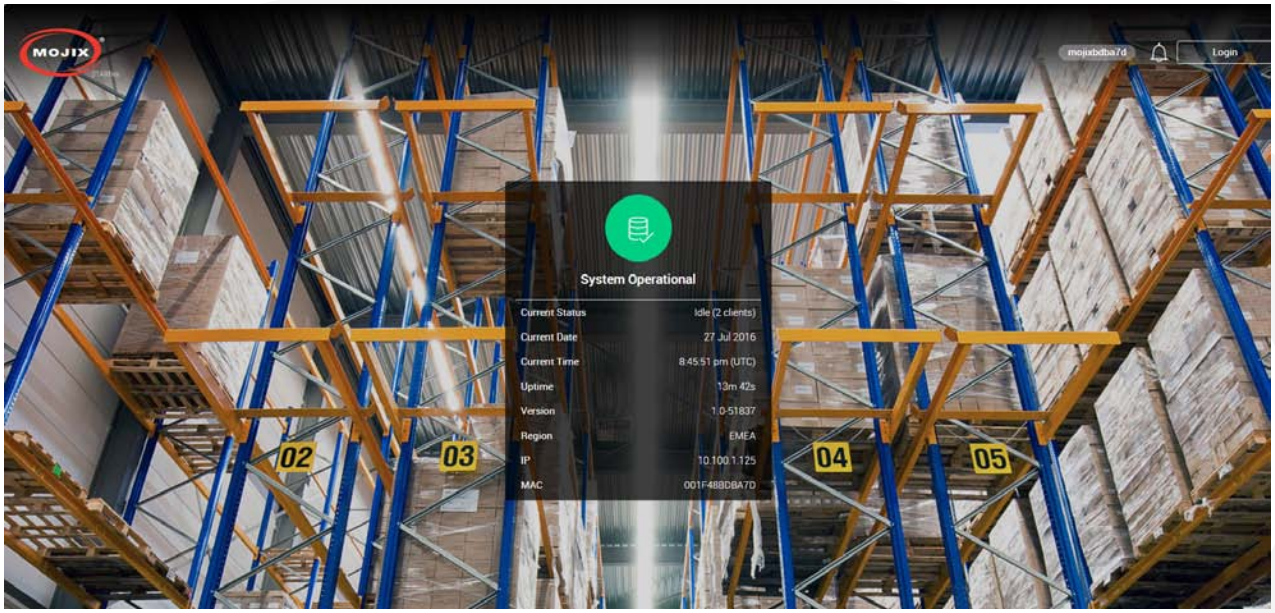
Close this window by clicking on the X icon at the top right corner of the window or by clicking on any space out of the window.

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.



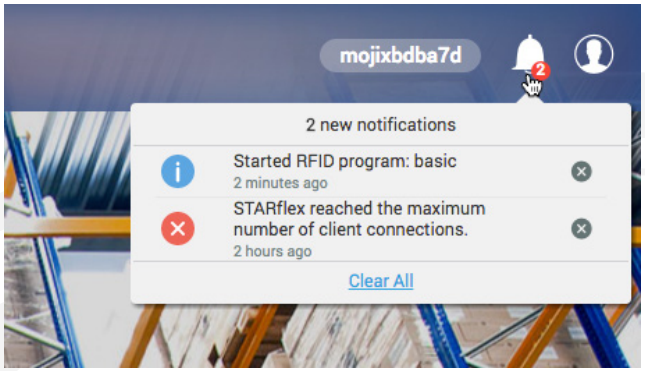
2.1.3 HOME PAGE

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.

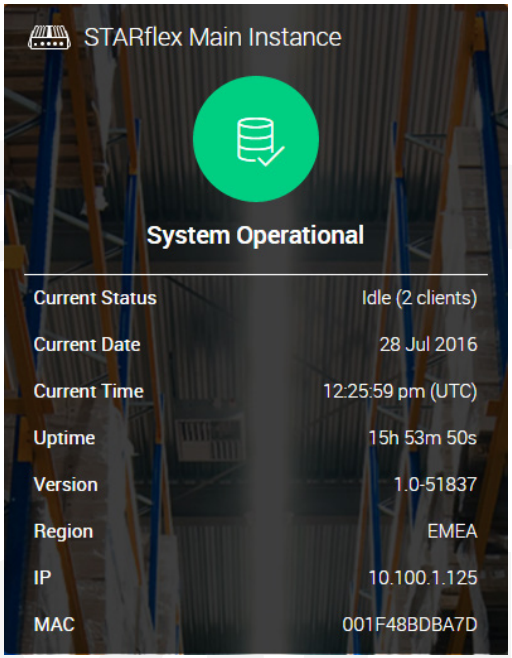
Clicking on the bell icon displays a list with the available notifications (exceptional conditions like low flash memory warnings, etc). It is possible to clear the list of messages one by one or all at once.



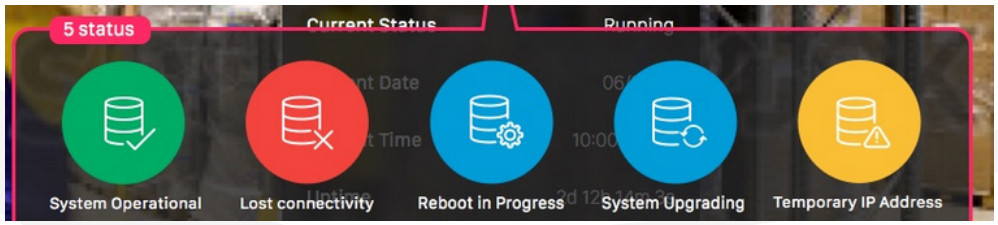
In the main menu, there is the information related to the STARflex explained below:

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:



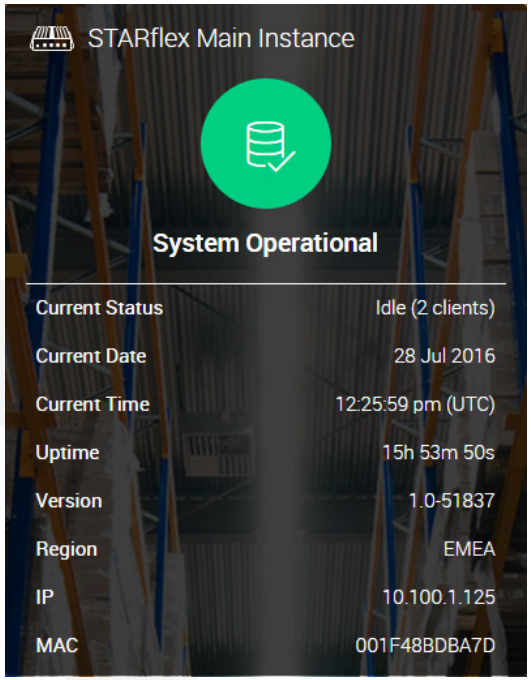
1. **System Operational**, (Green with a check mark) is indicated when the system is running correctly but no RFID program is running.
2. **Lost connectivity,** (Red) is indicated when there is no connectivity with the STARflex.
3. **Reboot in progress** (Blue) indicated when rebooting
4. **System Upgrading** (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 cursor is hovering the status icon the following message will appear: *Go to Network Settings to change the configuration to DHCP or static IP address*

This only appears when the Status is **Temporary IP Address.**

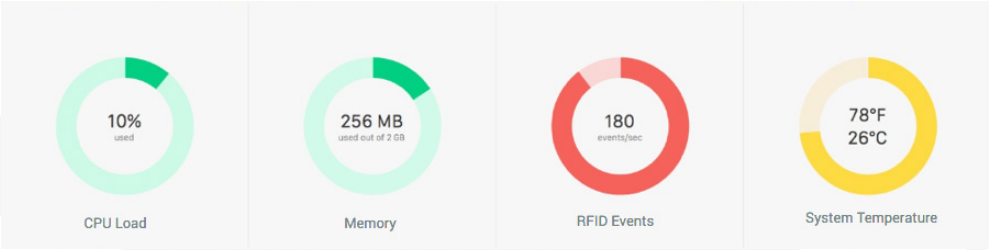
Additionally, further information can be presented:

- **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

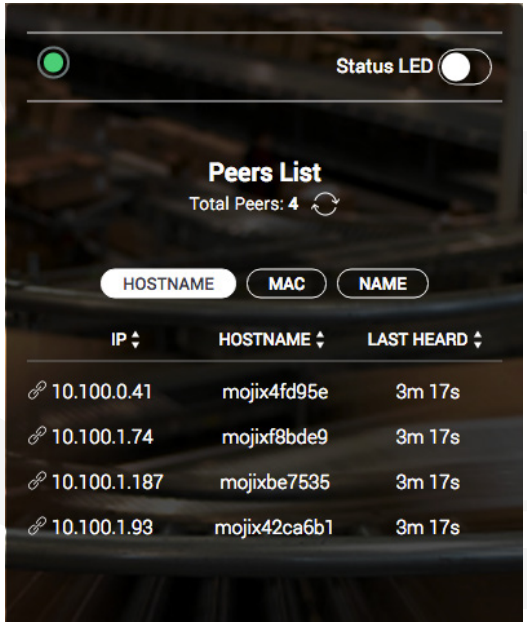
The details section displays a list of other STARflex's discovered on the network.

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.

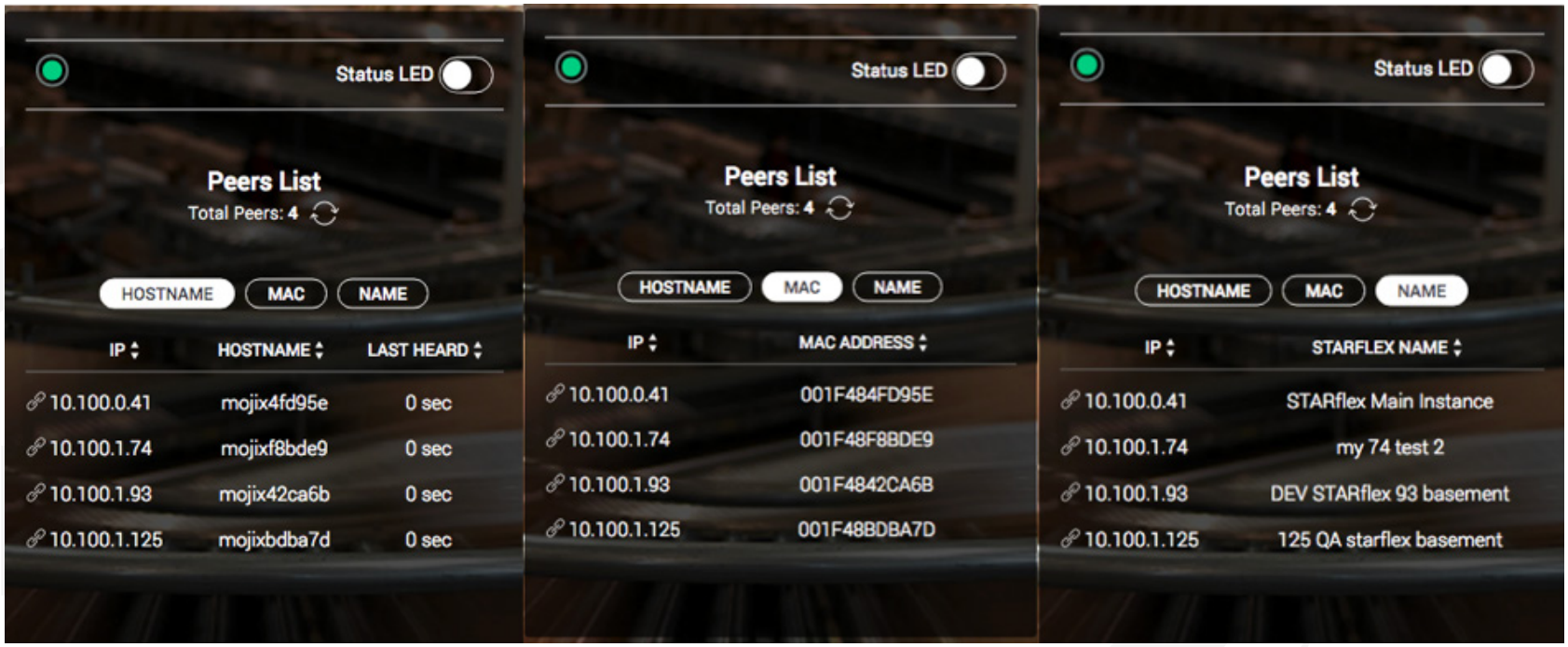
LED Status from API	"Status LED" Switch	LED
ON	**OFF**	Green
OFF	**OFF**	Gray
Blink	**ON**	Green Blinking
Keep Alive	**OFF**	Green flashing every 3 secs



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

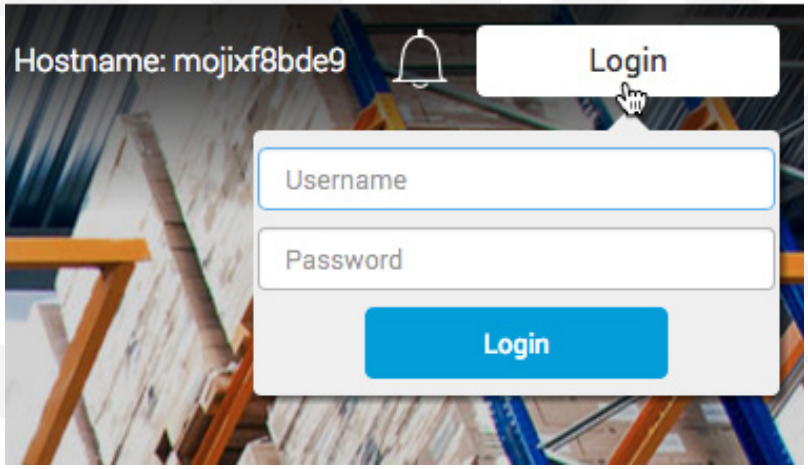
There are two modes to log in to STARflex: Basic Mode and Advanced Mode.

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.

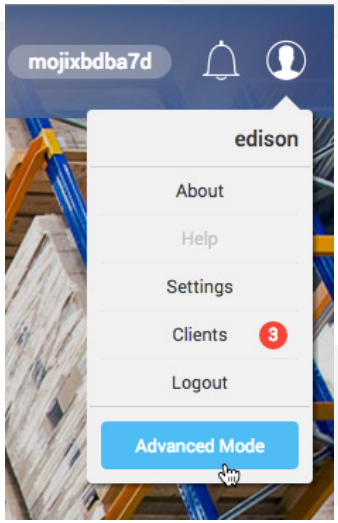
2. Enter the username in the **Username** field.
3. Enter the password in the **Password** field and click on the Login button or press enter.



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.



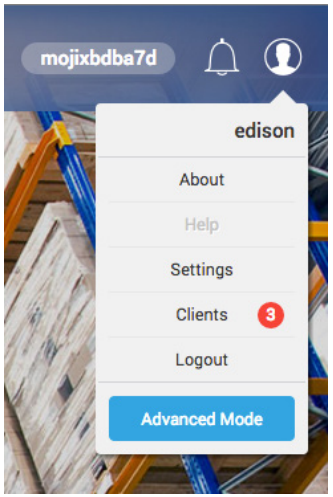
2. Enter the password in the Password field and click on the Continue button or press enter.

Note: The Advanced Mode password is disclosed only to professional installers.

The default credentials for the STARflex UI are provided below:

Username	Password	Security Level
edison	m0j1xInc	Intermediate

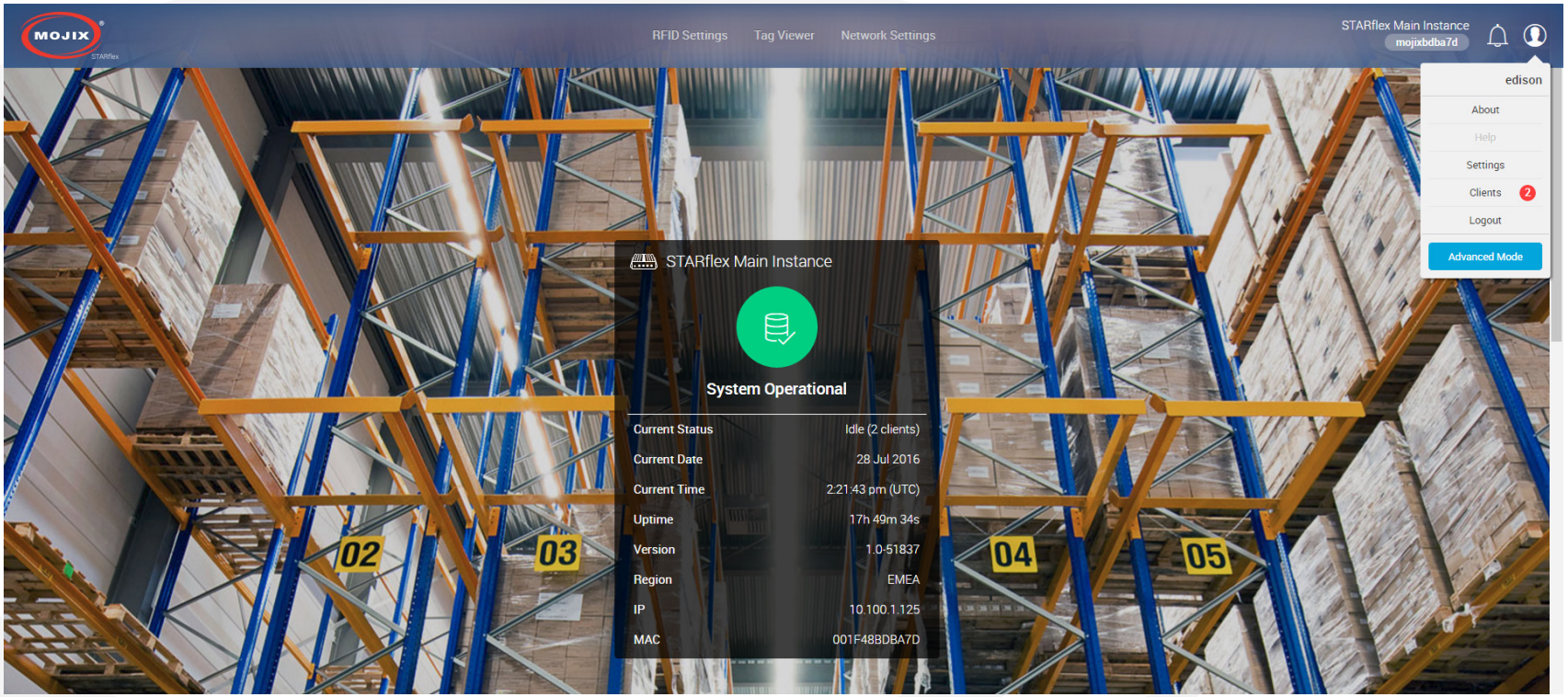
Under the User Icon the following options are available:



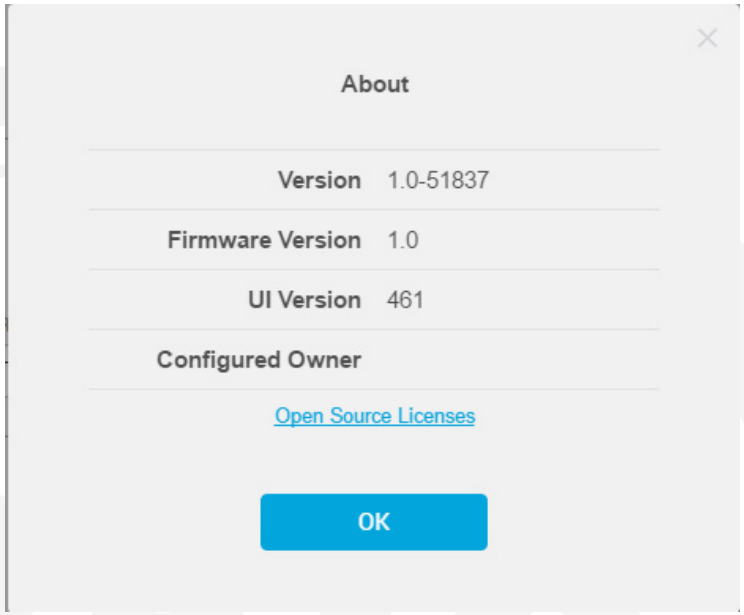
These options are detailed below:

2.1.5 ABOUT

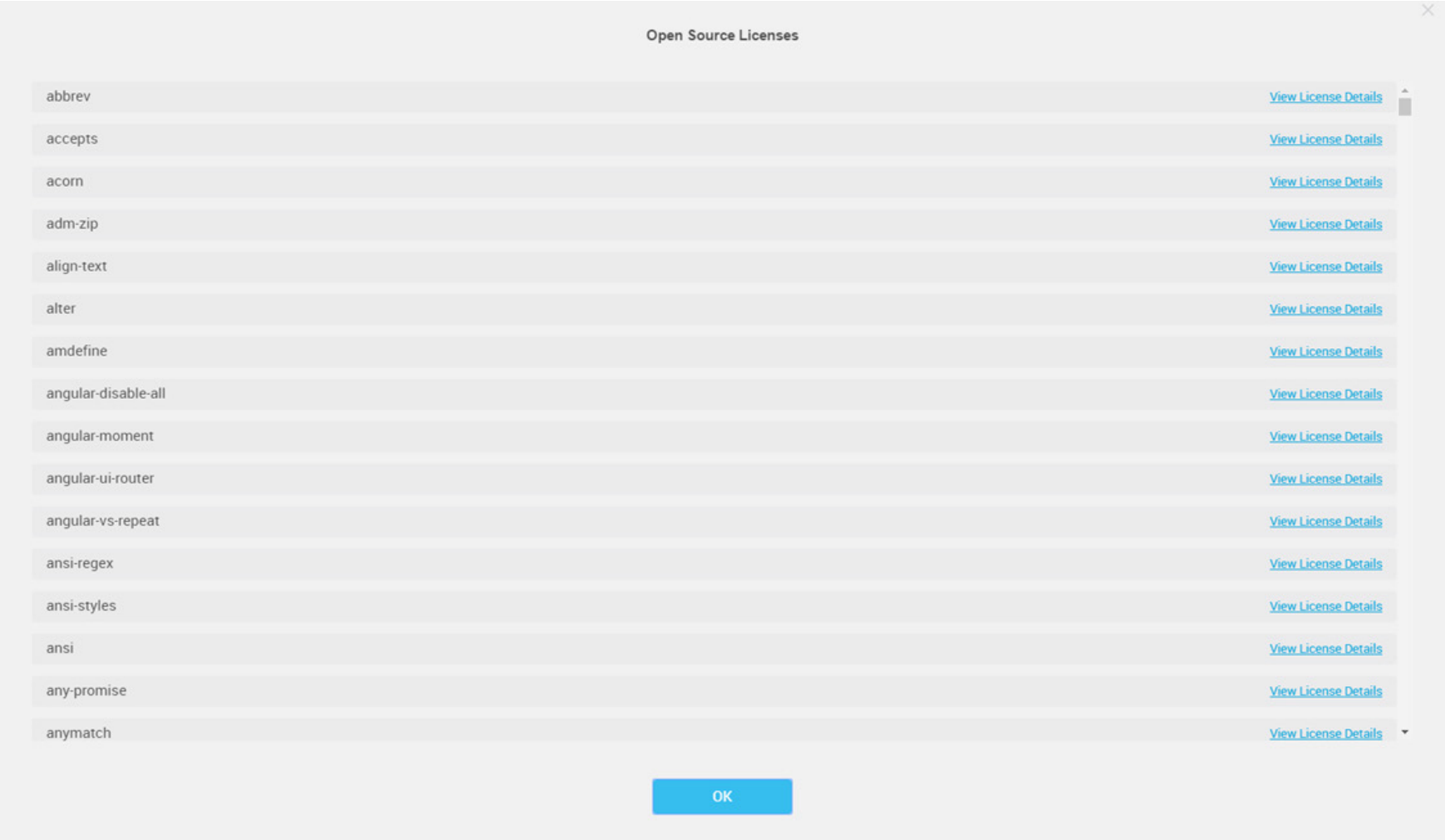
The “About” section is displayed for user logged on at the top right side of the page, clicking on the “user” icon and then in About.



This section shows information about the Firmware version, Version, Build Number, UI version and the Configured Owner of the STARflex.

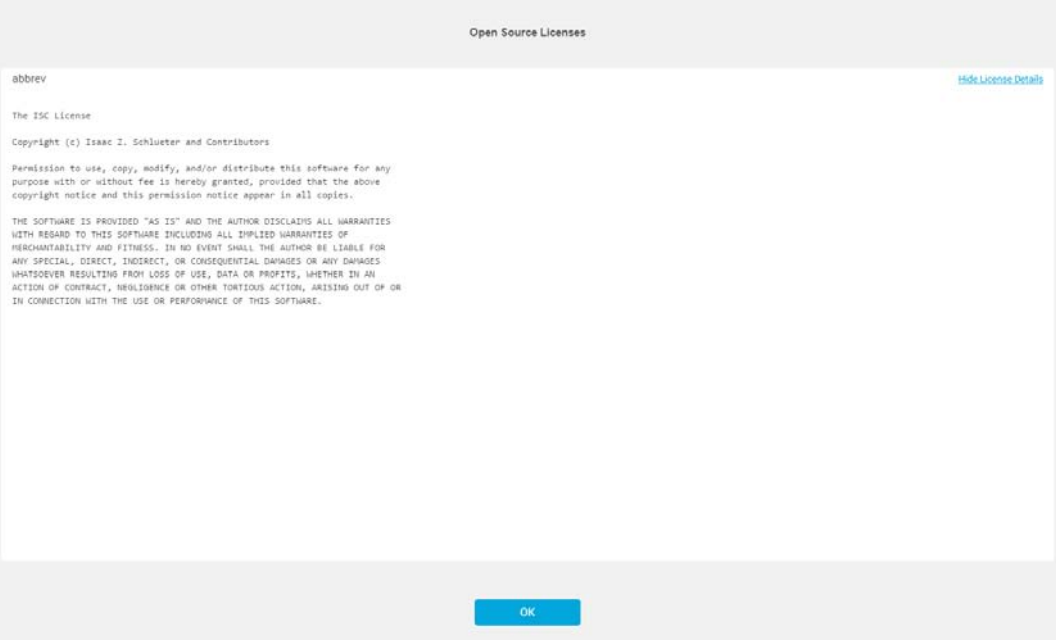


Click on the Open Source Licenses link to get the list of available licenses. View the content of the different licenses used for the STARflex by clicking on the View License Details link:



Some of the font 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.

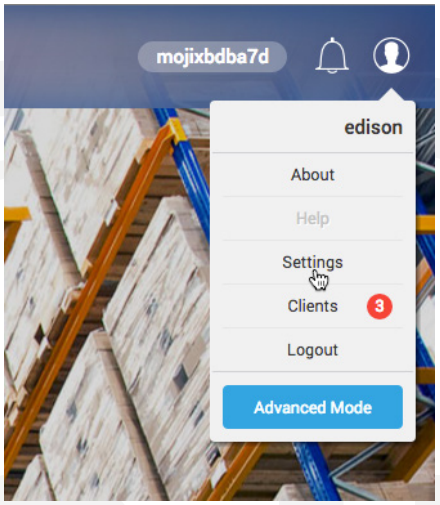
In addition, view the content of the different licenses used for the STARflex by clicking on the View License Details link:



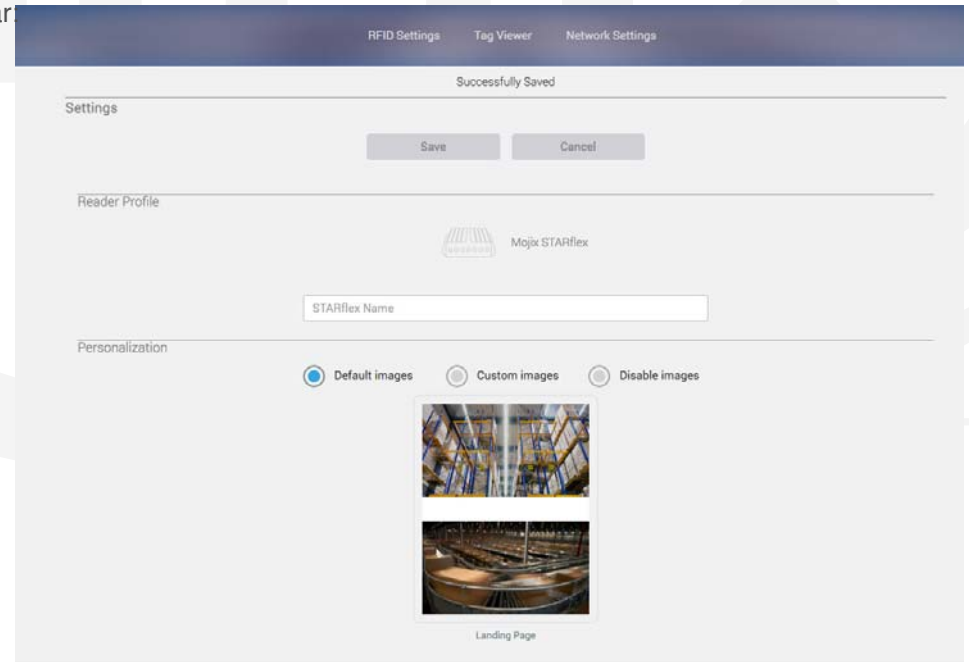
Click on *Hide License Details* to hide the information and return to the License main list.

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.

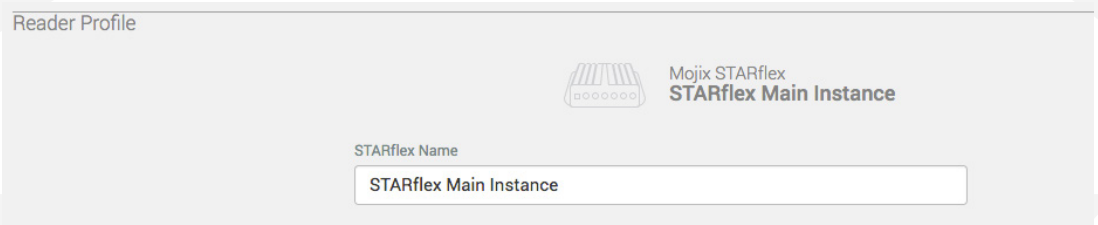


Click over the Settings option and the following configuration will appear

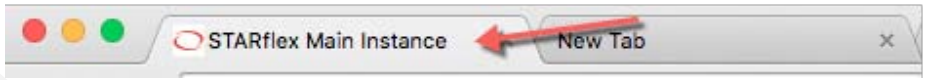


Reader Profile:

Associate a meaningful name to the STARflex device.



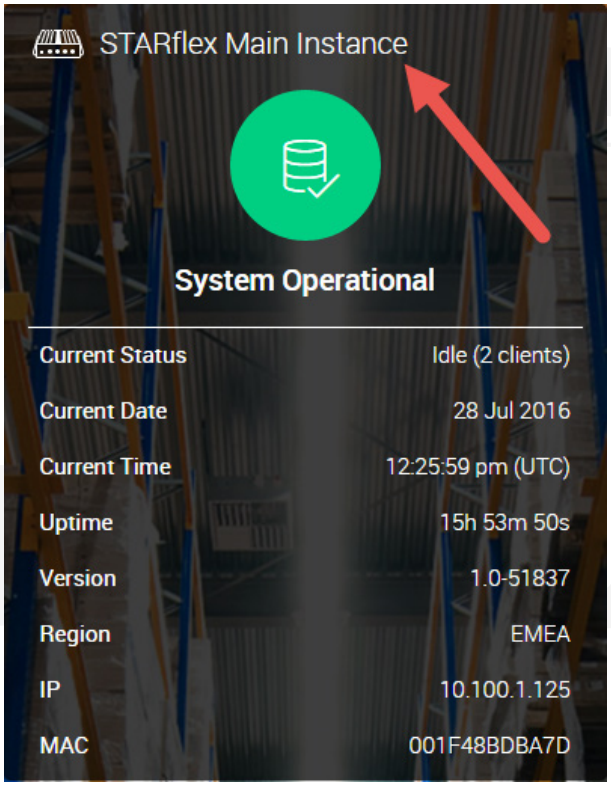
Click on the **Save** button and the label will be changed in the tab browser:



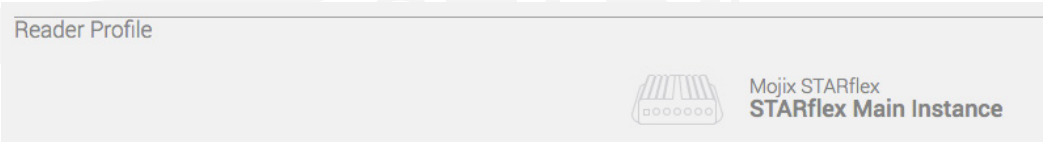
It will also update the label appeared in the following places:

In the landing page above System Operational label:

In the landing page above System Operational section:



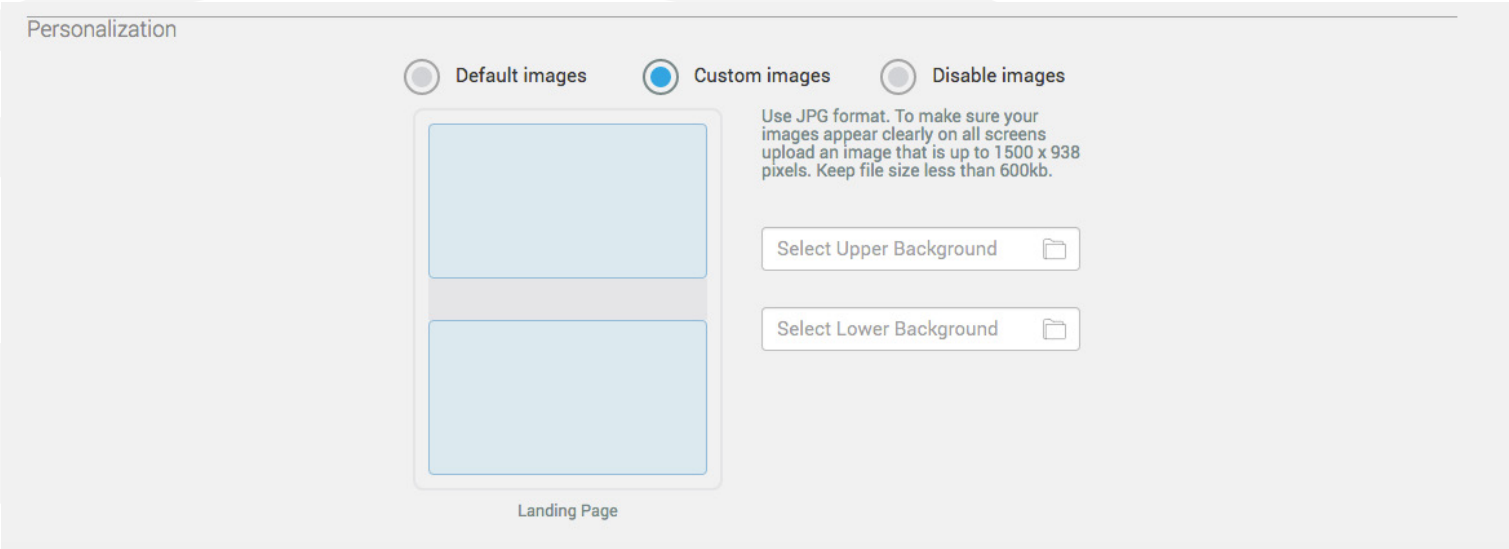
Under the Reader Profile Section:



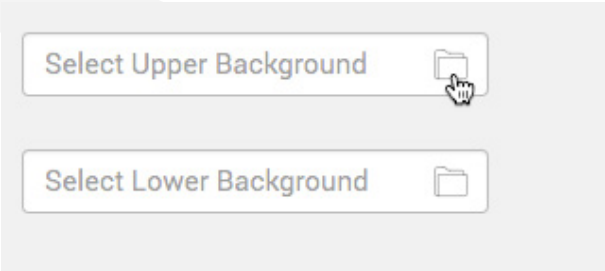
Personalization:

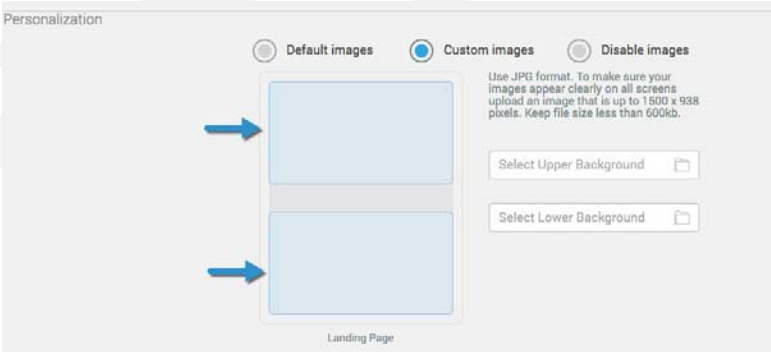
Select the background image the instance will use. The following three options can be selected:

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

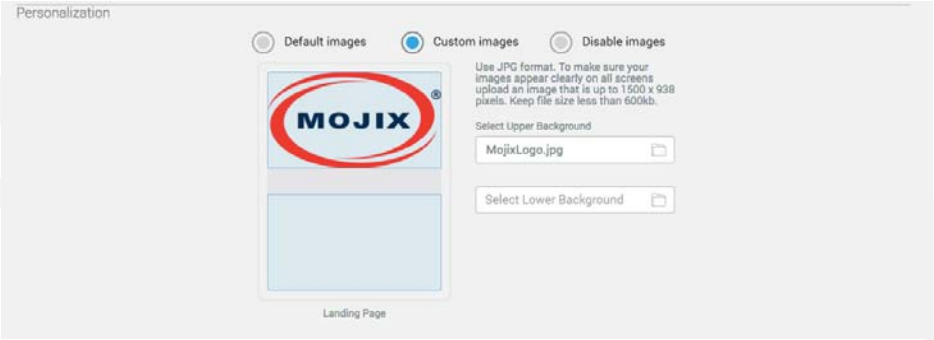


Custom Images: Upload two type of images, one for the upper background and the other one for the lower background. Click on the folder icon or in the select box to search for images in the local computer:

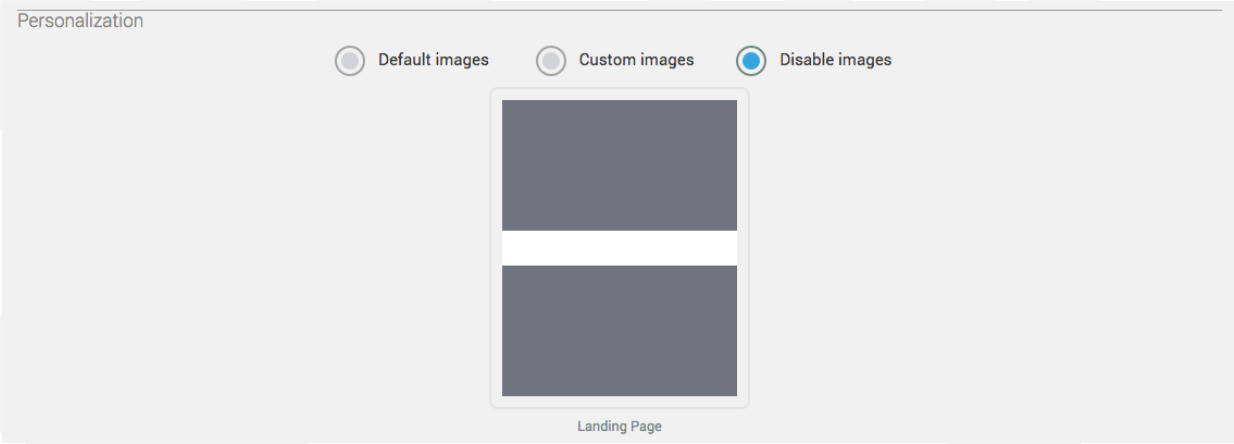




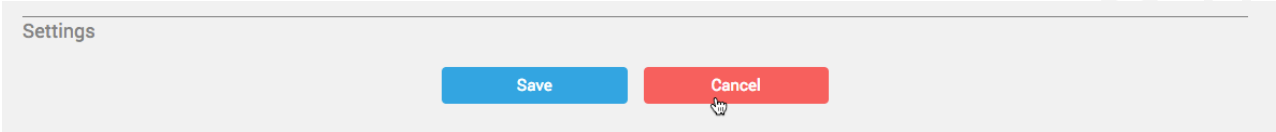
A preview of the image will appear in the upper background area.



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:

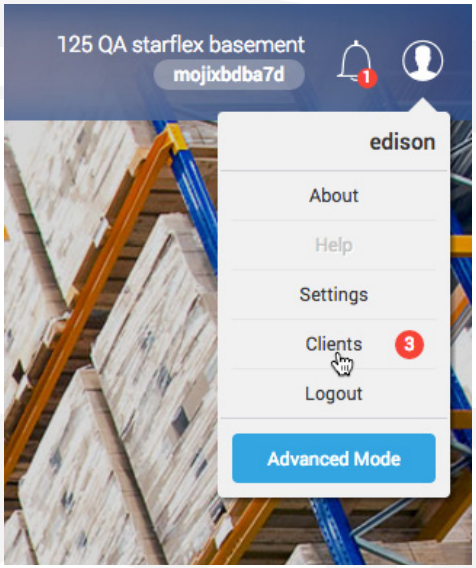


Click on the Save button in order to save changes or click on the **Cancel** button to discard changes.

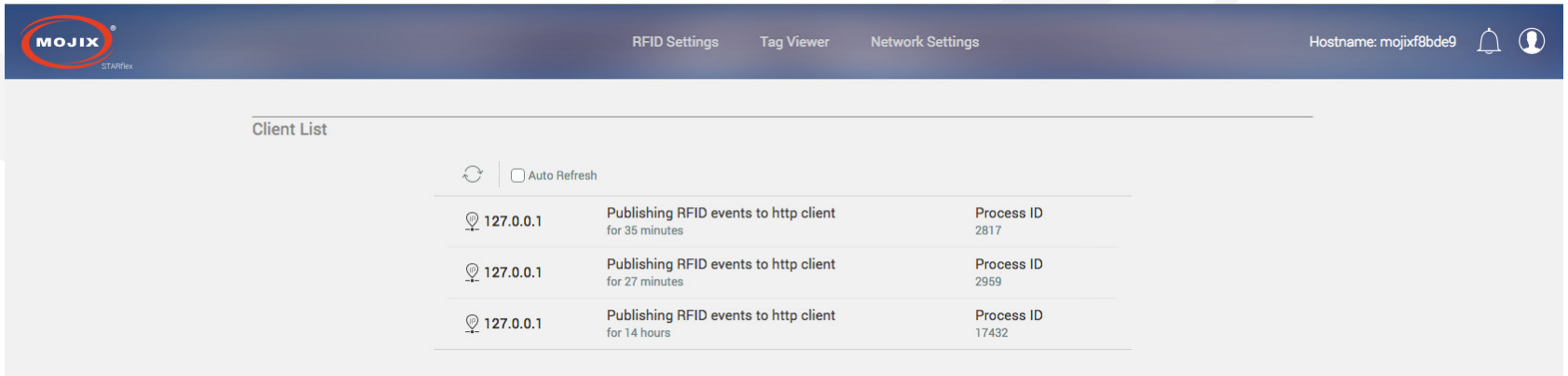


2.1.7 CLIENT LIST

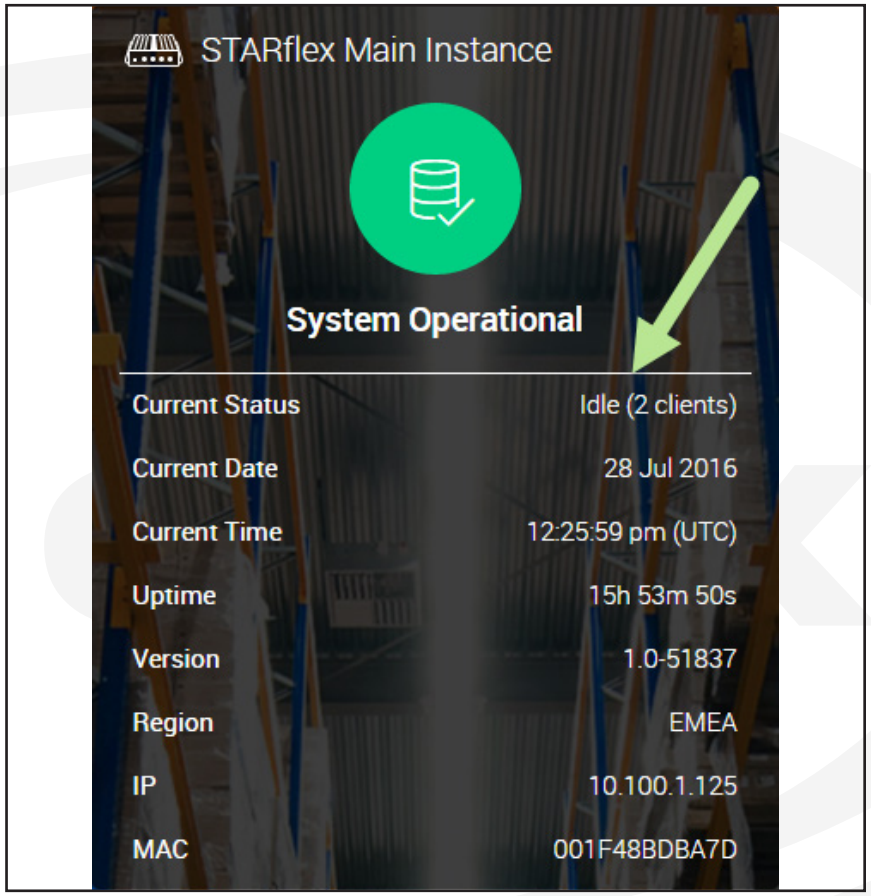
The client list page displays the information of every client that is connected to the STARflex. The number of available clients will be displayed inside the user profile menu:



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:

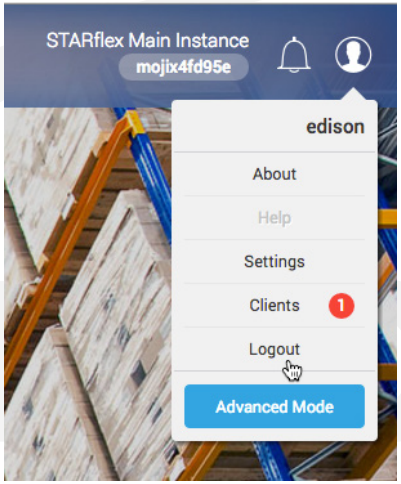


2.1.8 LOGGING OUT OF STARFLEX

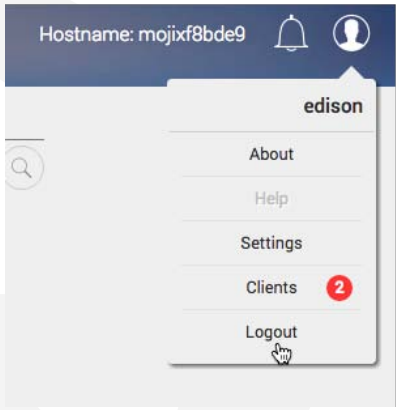
Logging out allows you to exit the current STARflex session. Perform the following procedures to log out of the STARflex user interface:

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

From the Basic Mode:



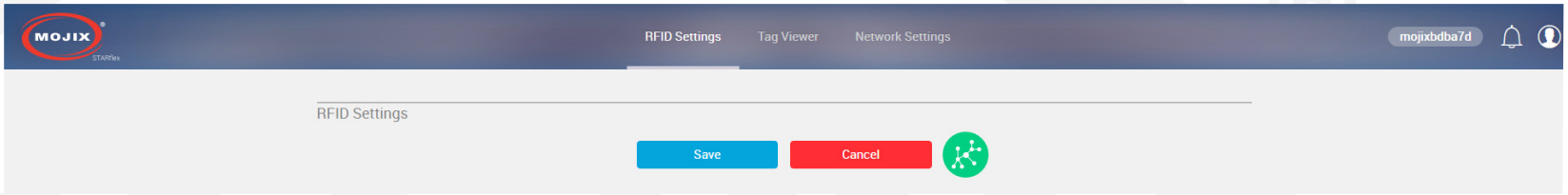
From the Advanced Mode:



2.1.9 BASIC MODE

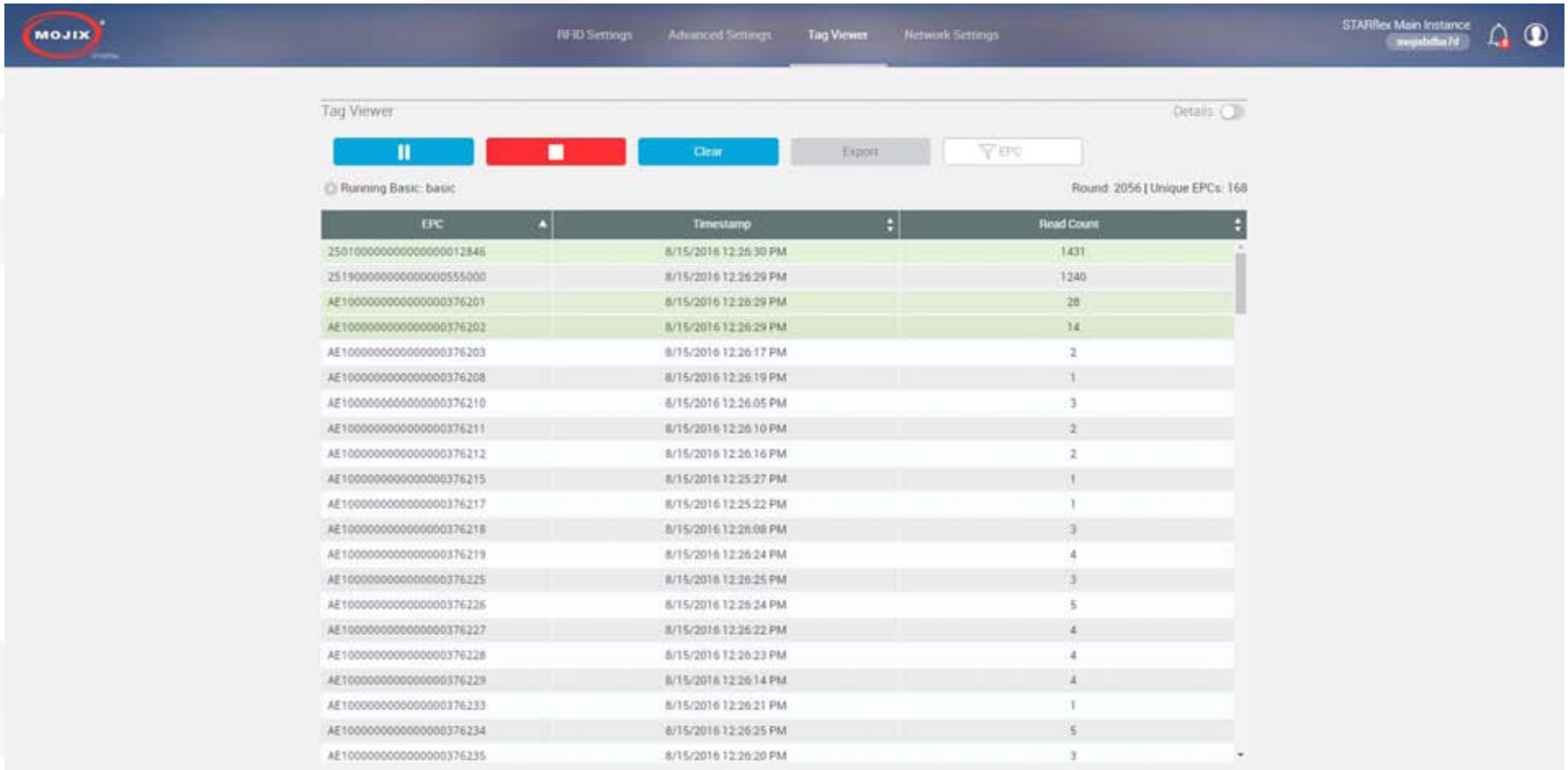
RFID Settings

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, receive antenna mode, physical layer settings and patterns. For detailed information please refer to Chapter III RFID Settings.



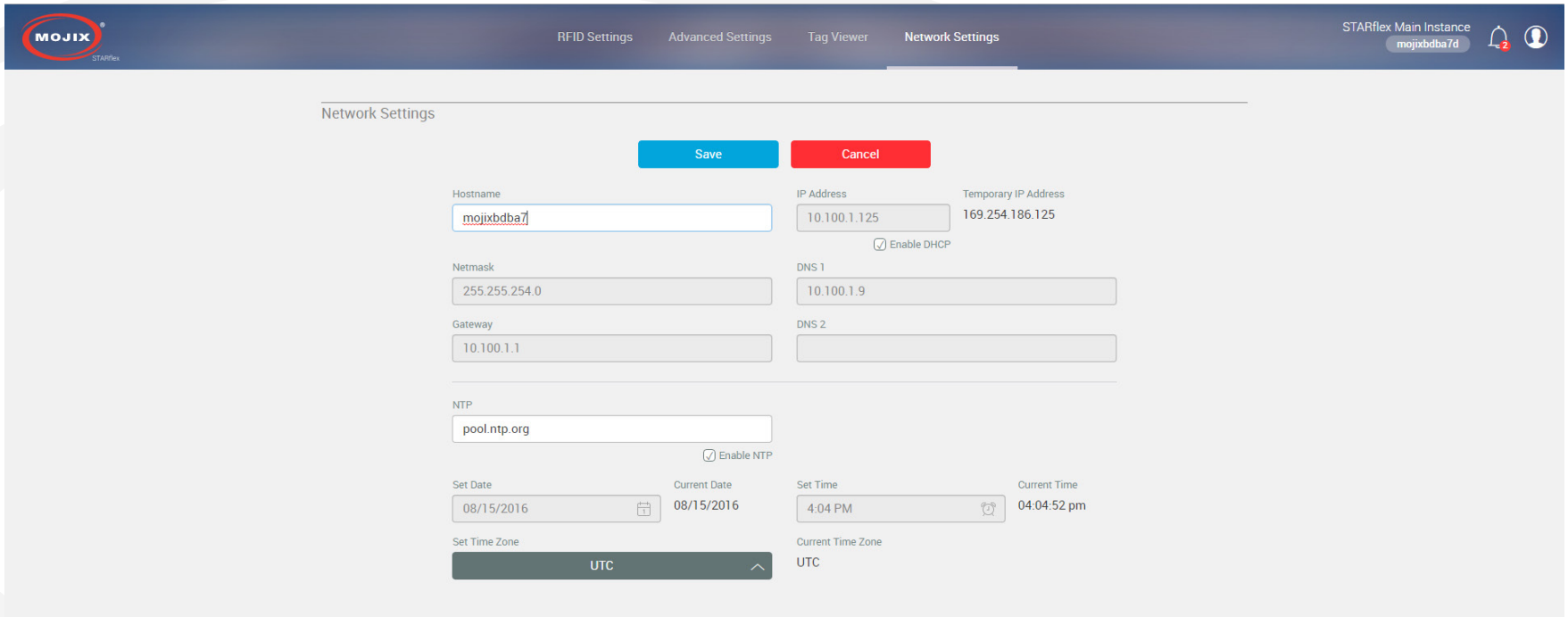
Tag Viewer

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.



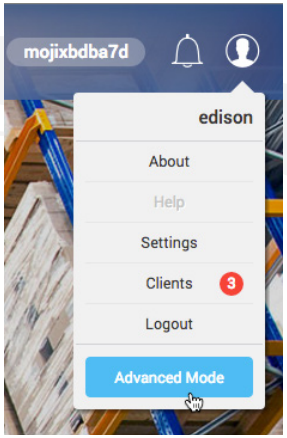
Network Settings

The network settings section describes a set of fields to configure the network that the STARflex will use. In this menu the DHCP values can be assigned to the STARflex. For detailed information please refer to Chapter V Network Settings.

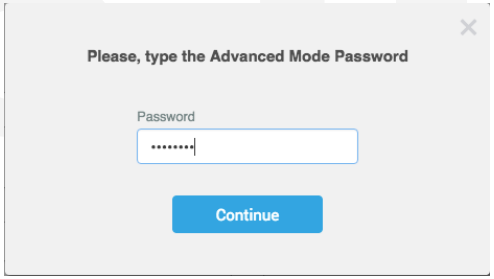


2.1.10 ADVANCED MODE

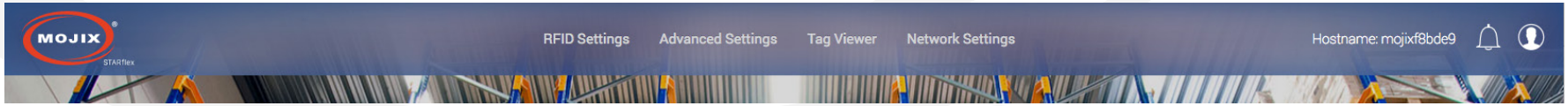
Access to the Advanced Mode by selecting the option, then click on the Advanced Mode button:



Introduce the password to have access to the Advanced Mode:



Inside the Advance Mode, the following tabs are available:

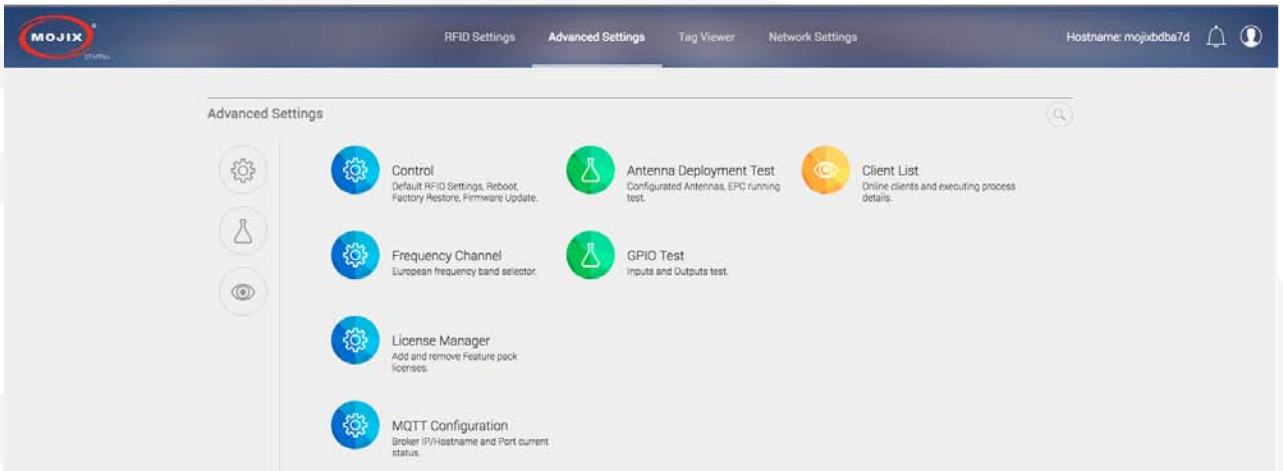


For detailed information of each one of the tabs, refer to Chapter III - RFID Settings, Chapter IV - Tag Viewer and Chapter V - Network Settings

Advanced Settings

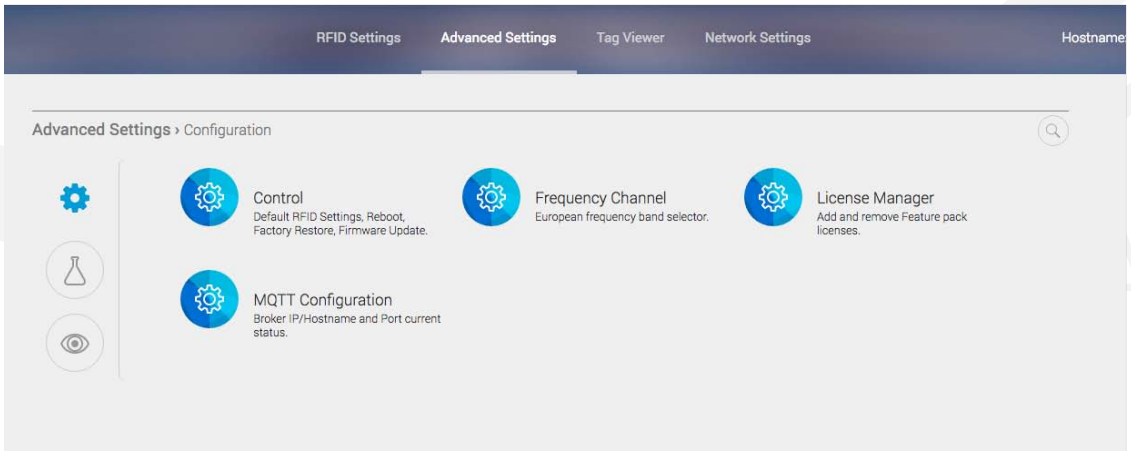
The Advanced Settings tab includes the following configuration options:

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

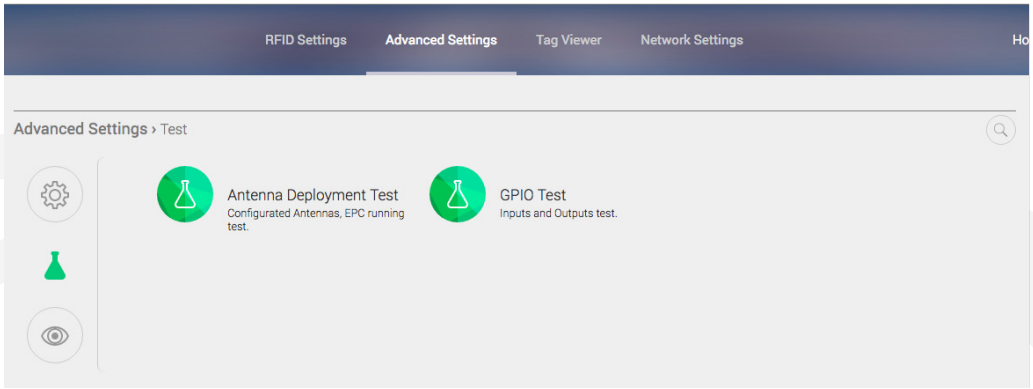


While at the left side, 3 filters for each one of the groups are displayed:

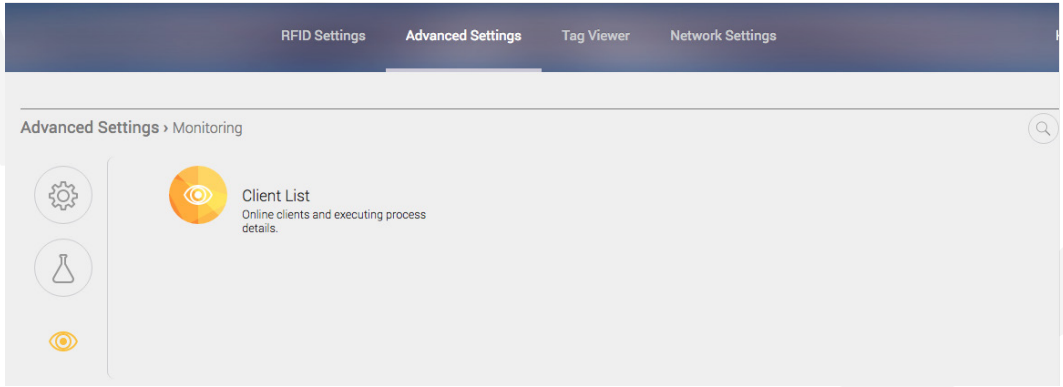
Configuration:



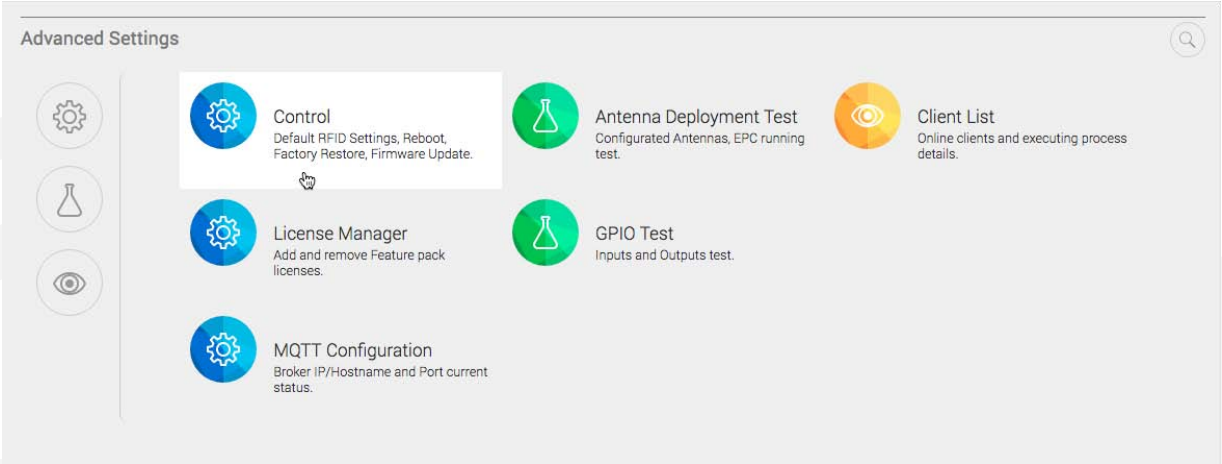
Test:



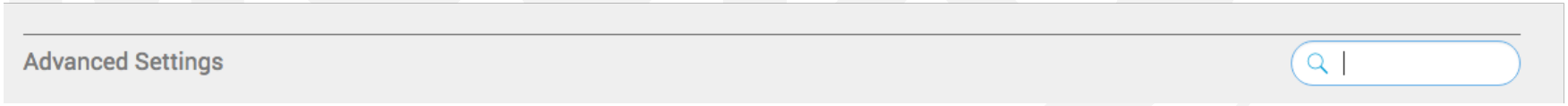
Monitoring:



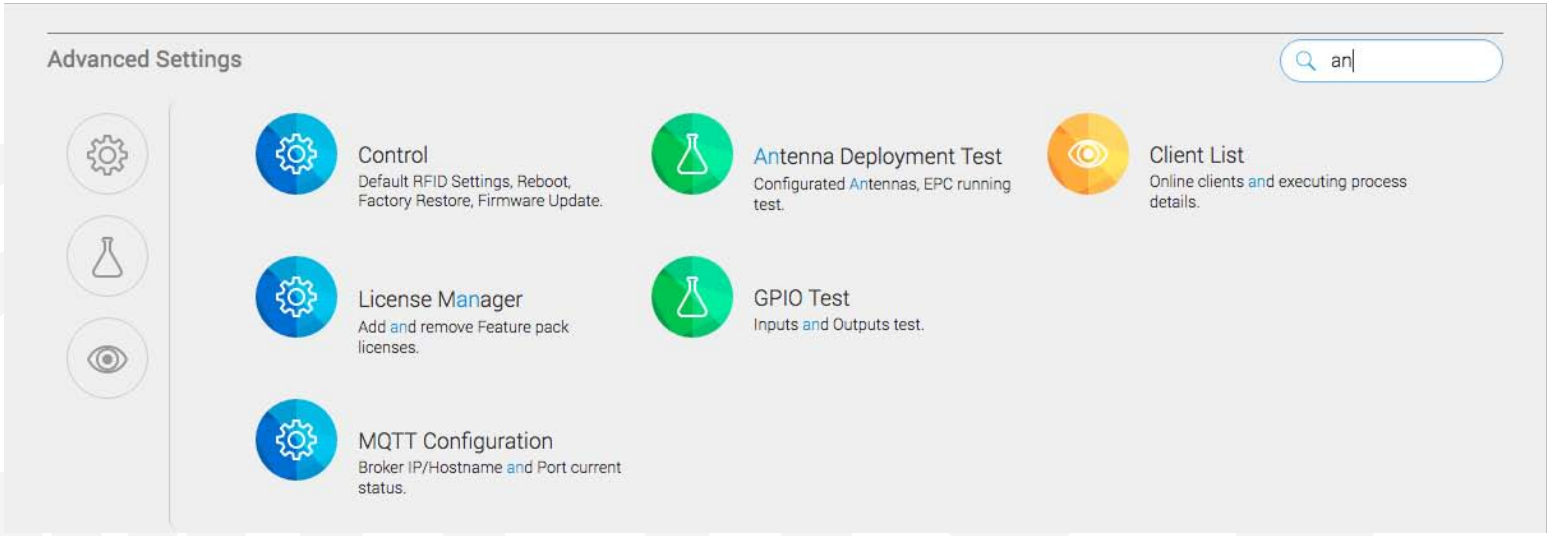
- Mouse over to highlight the option:



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



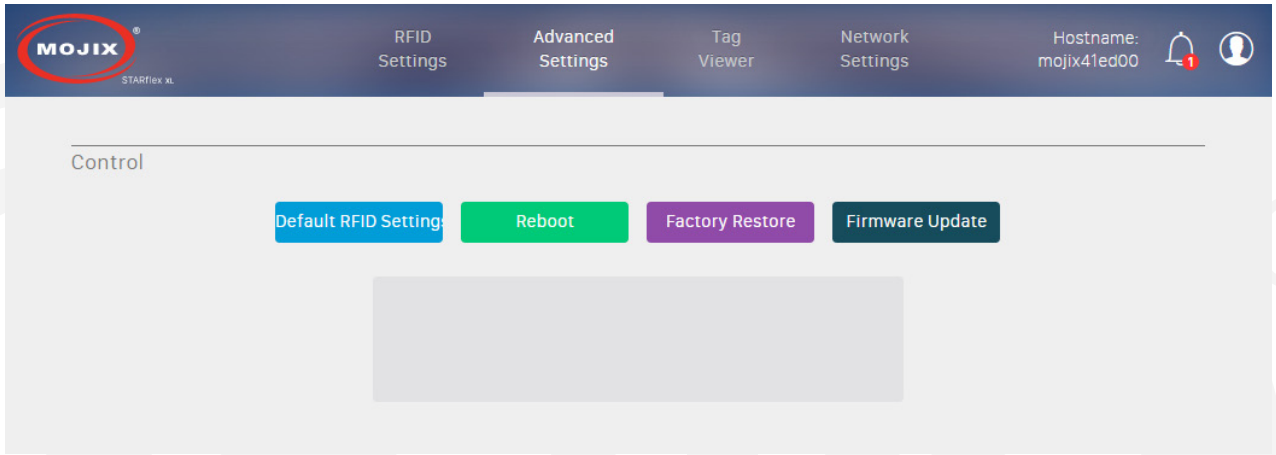
Introduce some text inside the text field and it will automatically highlight the text found among the different options:



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

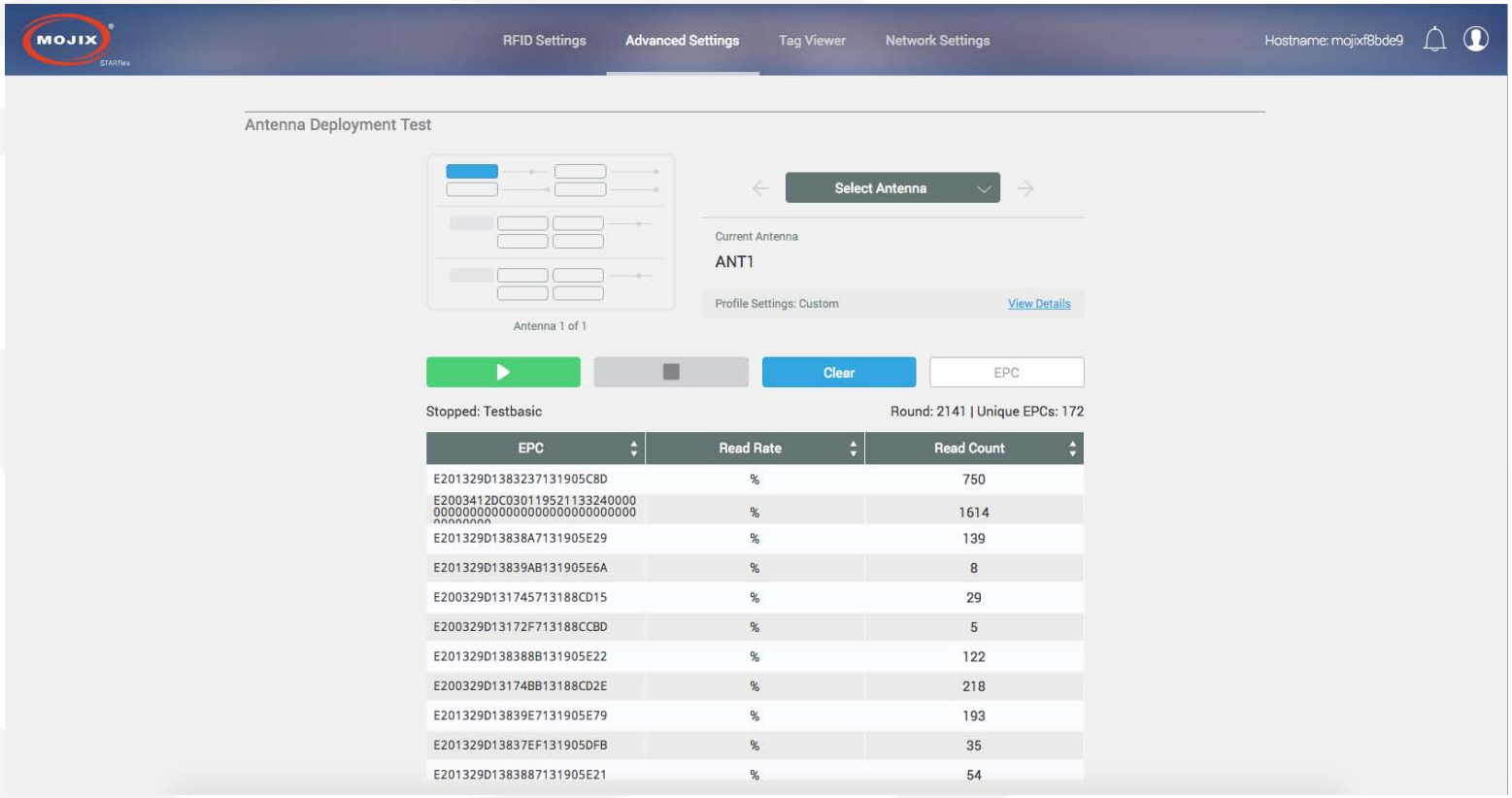
Control

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.



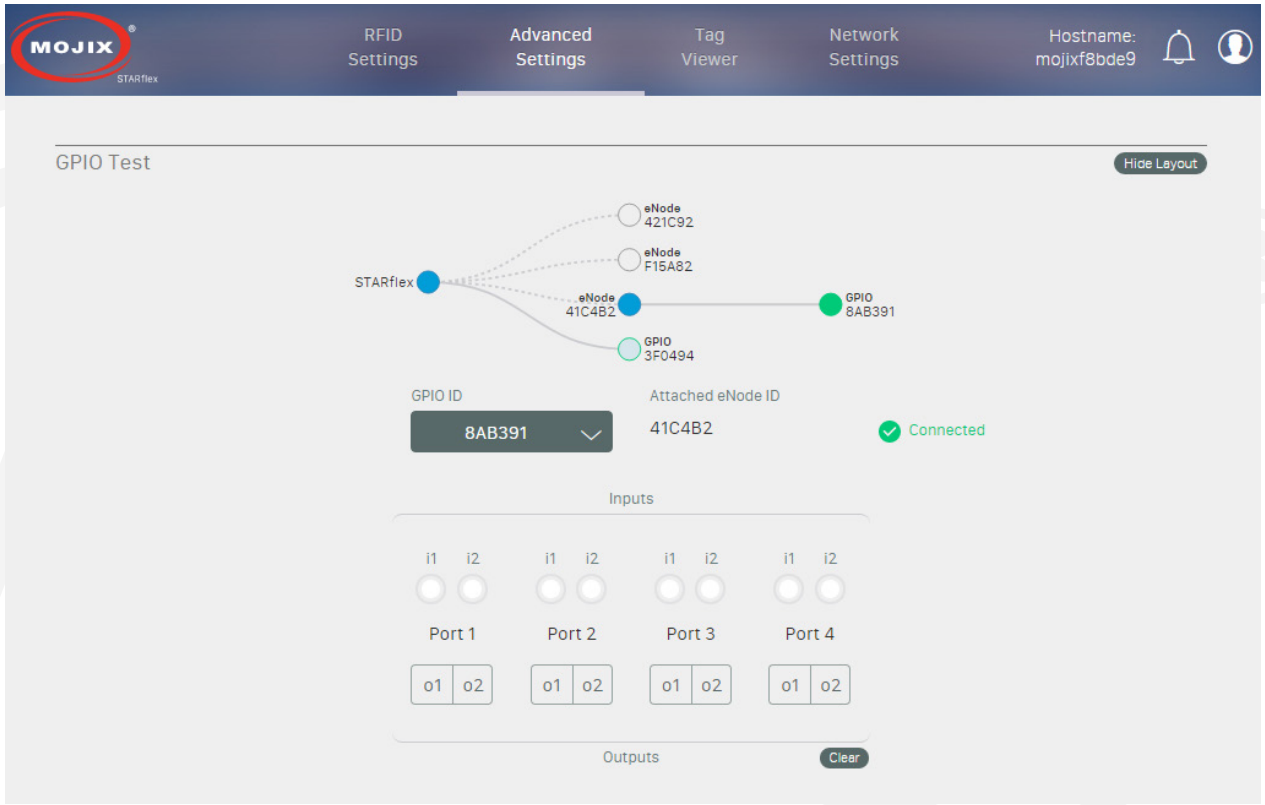
Antenna Test

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.



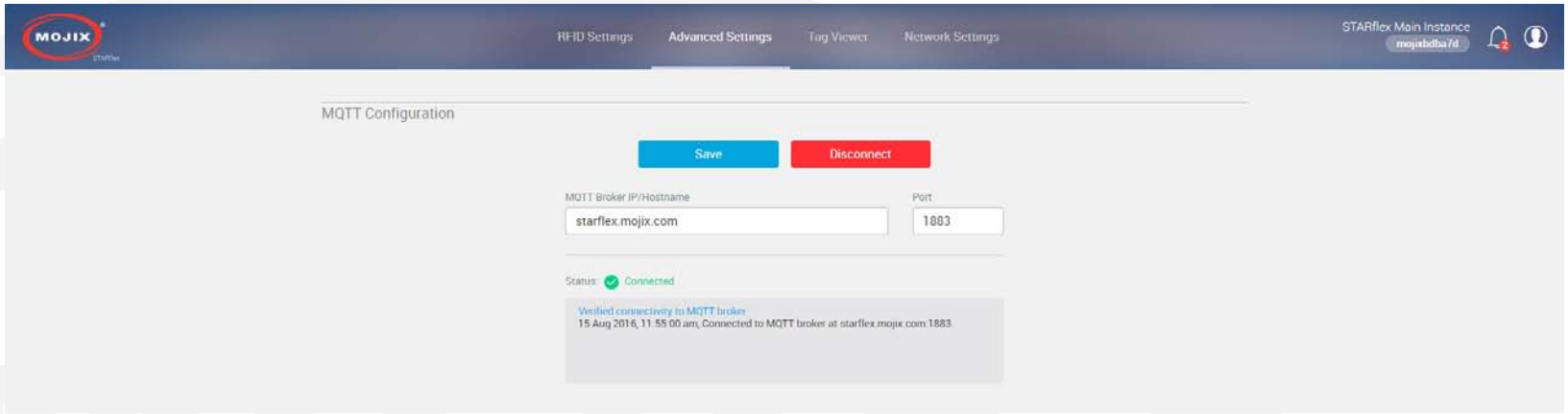
GPIO Test

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.



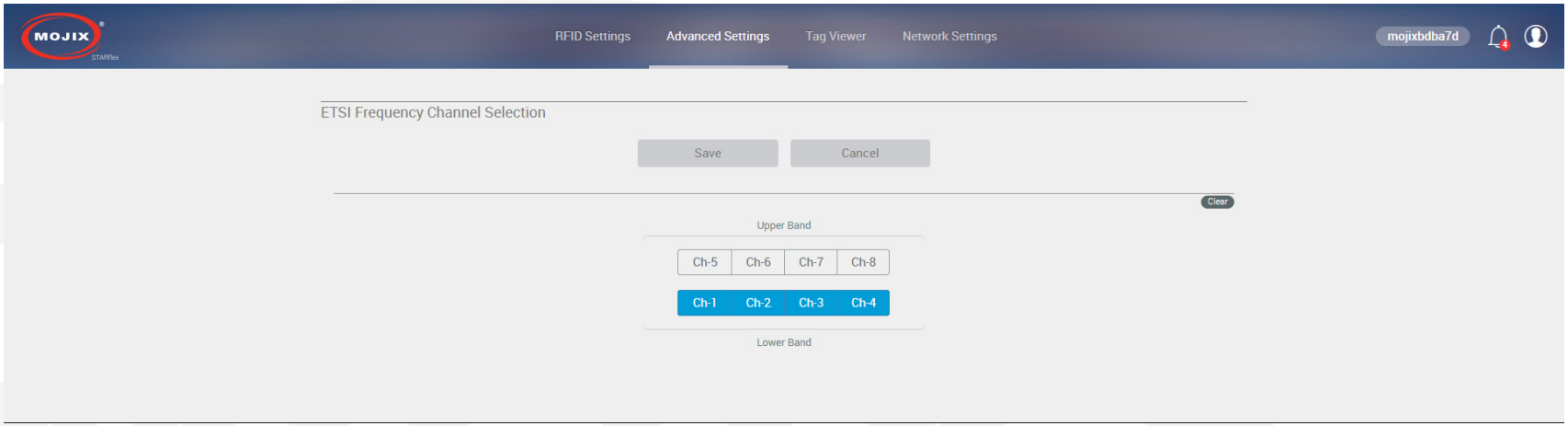
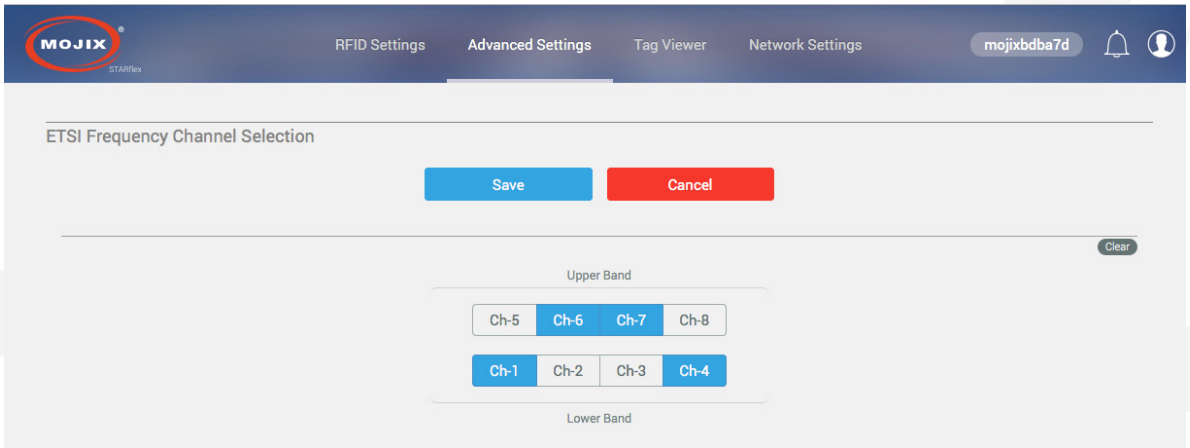
MQTT Configuration

The “MQTT Configuration” page allows the user to set up the hostname/IP address, port to connect and test to the MQTT broker. For detailed information please refer to Chapter VI - MQTT Configuration.



Frequency Channel

STARflex automatically detects its “Jurisdiction” on boot up and disables this control for all models except EU models. The “Jurisdiction/model” of STARflex can not be changed in the field. Only low band channels are all selected by default.



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