UnaBell LTE-M

User Guide

unabiz

Trademark

Revision History

Revision	Publish Date	Author(s)	Comments
1.0	13 Jan 2022	Albert Chen	Initial version
1.1	16 Aug 2022	Rivon Hsu	Product information update Adding EU Declaration of Conformity
1.2	7 Oct 2022	Rivon Hsu	Revise Product Name to UnaBell LTE-M Revise Document Format Revise EU Declaration of Conformity

Content

1. Introduction

1.1 About this Guide

The purpose of this guide is to provide quick start instructions and information on setting up and using UnaBell LTE-M to receive data for your applications.

The quick start instructions for the UnaBell LTE-M solution include:

- Device activation and installation
- Device configuration and data visualization with the fully integrated UnaConnect IoT Device Management Cloud Platform
- Device Firmware Over-the-Air (FOTA) update with the UnaConnect platform

1.2 Glossary

Uplink or UL	An uplink message is a message sent by the device to the cloud
Downlink or DL	A downlink message is a message sent by the cloud to the device
Timer Mode	Device counts the number of clicks detected and sends the count in an uplink message at pre-configured intervals
Event Mode	Device immediately send an uplink message when a click is pressed by the user
Heartbeat Mode	The heartbeat mode can be selected along with Event or Occupancy modes. A heartbeat message is sent periodically by the device to inform the user on battery life, changes in configuration etc.
Occupancy Mode	Device sends an uplink message as it identifies the state has changed between Open or Closed States

Open State	The state when the external connector is in the open state, for example a pressure sensor is open
Closed State	The state when the external connector is in the closed state, for example a pressure sensor is closed
Debounce Timer	A countdown timer used in occupancy mode that is reset every time the external connector detects a state change to distinguish if a state is in open or closed states
Occupancy Duration	The period of time from which the debounce timer starts to countdown so if no state change is detected past the occupancy duration (and the timer countdown reaches 00:00) then the device identifies the space as open

2. Hardware Features & Specifications

2.1 Overview

UnaBell LTE-M is a battery powered smart button that can be configured to send messages and trigger actions for a variety of applications. The device is IP54 for dust and water protection and can last at least *2,000 clicks* with two replaceable AA batteries.

Additionally, plug-and-play accessories such as reed switch or temperature probe may also be purchased. These can be plugged to the UnaBell LTE-M via *3.5mm audio jack connectors* and be used to detect the opening/closing of doors or measure ambient temperature of a space, respectively.

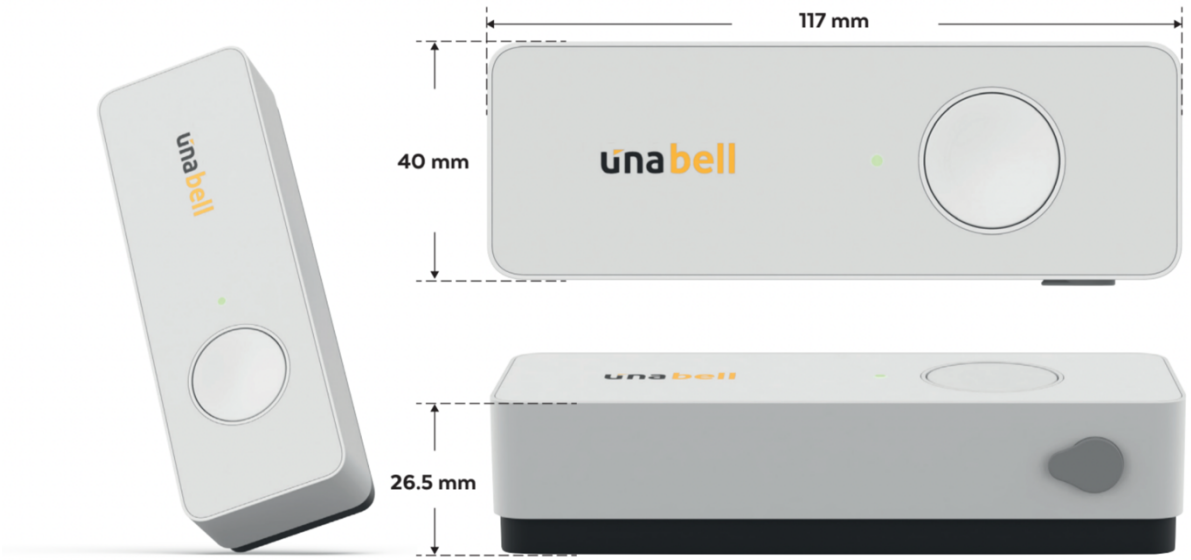
Seamlessly integrated with UnaConnect, a secure and reliable IoT Device Management Cloud Platform, UnaBell LTE-M and its optional accessories can be quickly and easily configured and installed to provide the trigger messages or temperature data for your use cases.

2.2 Features

- **Minimum 2,000 clicks** with replaceable AA batteries
- **IP54** for dust and water protection
- **eSIM or Plastic SIM** can be used based on your local network provider
- **UnaConnect Compatible**: UnaBell LTE-M sends data through the LTE network and is received by the UnaConnect IoT Middleware for data parsing, enrichment and connection to end points
- **Firmware Over-the-Air (FOTA)** via LTE-M network to update device firmware
- **4 Click Types** to configure the trigger messages from the device
- **Battery Monitoring** in Heartbeat Messages to monitor device health
- **Accessories with 3.5mm Audio Jack** (purchased separately):
  - **Reed Switch** Accessory to detect opening/closing of doors
  - **Temperature Probe** Accessory to measure ambient temperature of a space
  - **2-Wire** Accessory to connect with other sensors (e.g. pressure sensor)

- **Smart Modes**:
  - **Event Mode** to immediately send a message when a button is clicked. In addition, this can be used with the reed switch accessory to send messages when a door is opened or closed.
  - **Timer Mode** to count the number of clicks on the button at pre-configured intervals. In addition, this can be used with the temperature probe accessory to send temperature data at the defined intervals.
  - **Occupancy Mode** to send a message at the start and end of a state. For example, this can be used with the 2-wire accessory to connect to pressure sensors to detect the state of a seat (occupied/vacant).

2.3 Specifications



Device Characteristics	
Dimension	117 (L) x 40 (W) x 26.5 (H) mm
Weight	78g (without batteries)
Dust/Water Resistance	IP54
External I/O Port	3.5mm Jack for Sensor Accessories
Operating Temperature	-10 ~ +60°C
Battery Type	2x AA 1.5V Batteries (replaceable)

LTE-M Connectivity	
Support Bands	Band 2, 3, 4, 5, 8, 12, 13, 17, 20, 28
SIM Cards	eSIM or Plastic SIM Card
Module	Sequans Monarch GM01Q

Support Click Types	
Single	1 short click
Double	2 short clicks within 2 seconds
Long	1 long click for pressing longer than 2 seconds
Extra Long	1 long click for pressing longer than 6 seconds

LED Indicators	
Orange Blinking	Power ON/Activation Network Scanning/Searching SIM Card Firmware Upgrade (FOTA)/eSIM OTA
Green Slow Blinking	Network Connecting
Green 1 Short ON	Button click detected
Green Fast Blinking	Data Transmitting

LED Indicators	
Green 1 Long ON	Data Transmission Completed/Communication Success
Red 1 Long ON	Data Transmission ERROR/Communication Failed Network ERROR
Red Fast Blinking	Low Battery

Sensor Accessory – Reed Switch	
Dimension	23 x 14 x 6.35mm
Wire Length	1 meter
Operating Temperature	-40 ~ +125°C
Operating Distance	≤5mm (with default magnet)

Sensor Accessory – Temperature Probe	
Dimension	50mm x ϕ6mm (Probe Tube)
Wire Length	2 meters
Operating Temperature	-55 ~ +125°C
Temperature Range and Accuracy	±0.5°C Accuracy between -10 ~ +85°C

Sensor Accessory – 2-wire Cable	
Wire Length	16cm
Contact Type	Connect to Dry Contact Relay or Switch

3. Activate & Install UnaBell LTE-M

3.1 Before You Start

The following pre-requisite steps need to be completed prior to setting up and using UnaBell LTE-M:

- ✔ Register the eSIM or Plastic Nano SIM with your selected network provider
- ✔ Register an account on *UnaConnect IoT Device Management Cloud Platform*
- ✔ Register the UnaBell LTE-M device(s) in a *Device Group* on *UnaConnect*

3.2 Activate UnaBell LTE-M

The activation process of UnaBell LTE-M is outlined below:

1. Unscrew and open the bottom casing of the UnaBell LTE-M.
2. Insert the Plastic Nano SIM or setup the eSIM as provided by your local network provider.
3. Insert 2 x 1.5 V Alkaline AA batteries.
4. UnaBell LTE-M powers on and checks for Plastic Nano SIM then the eSIM to identify the SIM to use.
5. The device then initializes and scans for the local LTE-M network for applicable bands and sends its first downlink message.
6. UnaBell LTE-M blinks green light while it initializes and scans the local LTE-M network for applicable bands (this could take up to 5 mins if it is connecting to a new network in a new country or region).
7. If initialization and network connection are successful, the device LED displays solid green light for 2 seconds.
8. After network connection is established, UnaBell LTE-M displays orange light while it sends its first downlink request from the device to the UnaConnect platform via LTE-M.
9. In response, the UnaConnect platform sends a downlink message to the device with new configurations if available (the downlink process may take 30-40 secs).
10. If initialization or network connection failed, UnaBell LTE-M displays solid red light for 2 seconds. *Please unplug and replug the batteries to try again*.
11. Screw back and close the bottom casing.

3.3 Install UnaBell LTE-M

To allow better connectivity performance and avoid damage to the device, there are some general guidelines for the installation of UnaBell LTE-M:

- Install the device with the UnaBell logo and button *facing up*, *facing outward* and *away from walls* where possible to allow better connectivity performance.
- Avoid exposing the device to high impact, high pressure water jet or temperatures exceeding its operational limits.

The UnaBell LTE-M device can be installed via 3 methods based on the environment of use:

1. On a flat and smooth wall surface, use the *Velcro tape* in the box, or a *strong double-sided tape* on the bottom of UnaBell LTE-M to tape the device to the wall.
2. If the wall can be bolted or screwed, use a *bolt or screw* on the wall surface, then hang the UnaBell LTE-M device on the wall.
3. You may also *tie a string/rope* around the hole on the bottom casing of the UnaBell LTE-M and hang the device on other items e.g. a doorknob.

4. Receive Your First Messages

4.1 Configuration Parameters

A set of configurable parameters defines the modes, behaviors and frequency of the messages sent from UnaBell LTE-M:

Parameter	Description	Example Value
Mode	There are 6 modes available on UnaBell LTE-M: • Timer • Event • Event + Timer • Event + Heartbeat • Occupancy • Occupancy + Heartbeat	Event
Uplink Frequency	In Timer Mode and Heartbeat Modes, this sets the number of timer messages or heartbeat messages per day	4
Downlink Interval	The duration for the device to send a downlink request to initiate the downlink process	12 Hours
Occupancy Duration	In Occupancy Modes, this sets the period of time from which the debounce timer starts to countdown so if no state change is detected past the occupancy duration (and the timer countdown reaches 00:00) then the device identifies the state has changed. For example, if this is set at 10 secs, then device will only change state after it detects the same state for longer than 10 secs.	900 Secs
Command	There are 4 commands available on UnaBell LTE-M: • No command • Full-band scan • eSIM OTA • FOTA	No Command
FOTA URL	Enter the URL for the FOTA process	URL
Config external I/O detection mode	There are 4 external I/O detection modes available on UnaBell LTE-M: • Off • Edge • Pulse • Temperature Sensor (DS18B20)	Off

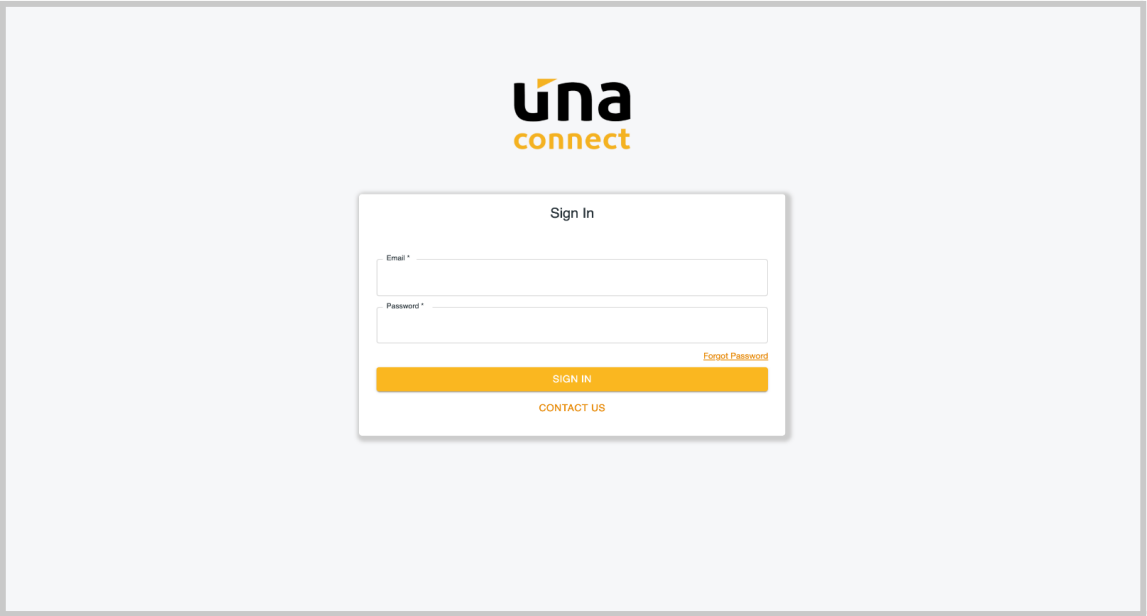
Parameter	Description	Example Value
Detection Delay Time	Delay on the detection of the triggers in edge detection mode	1 second
Enable Short Click Trigger	Enable or disable the short click trigger of the button	On
Enable Double Short Click Trigger	Enable or disable the double short click trigger of the button	On
Enable Long Click Trigger	Enable or disable the long click trigger of the button	On
Enable Extra Long Click Trigger	Enable or disable the extra long click trigger of the button	On
Enable Rising Edge Trigger	Enable or disable the rising edge trigger of the button	On
Enable Falling Edge Trigger	Enable or disable the falling edge trigger of the button	On

After UnaBell LTE-M activation has been successfully completed as outlined in Section 3 Activate & Install UnaBell LTE-M, the device will perform its first downlink to update the device with values as configured by the user.

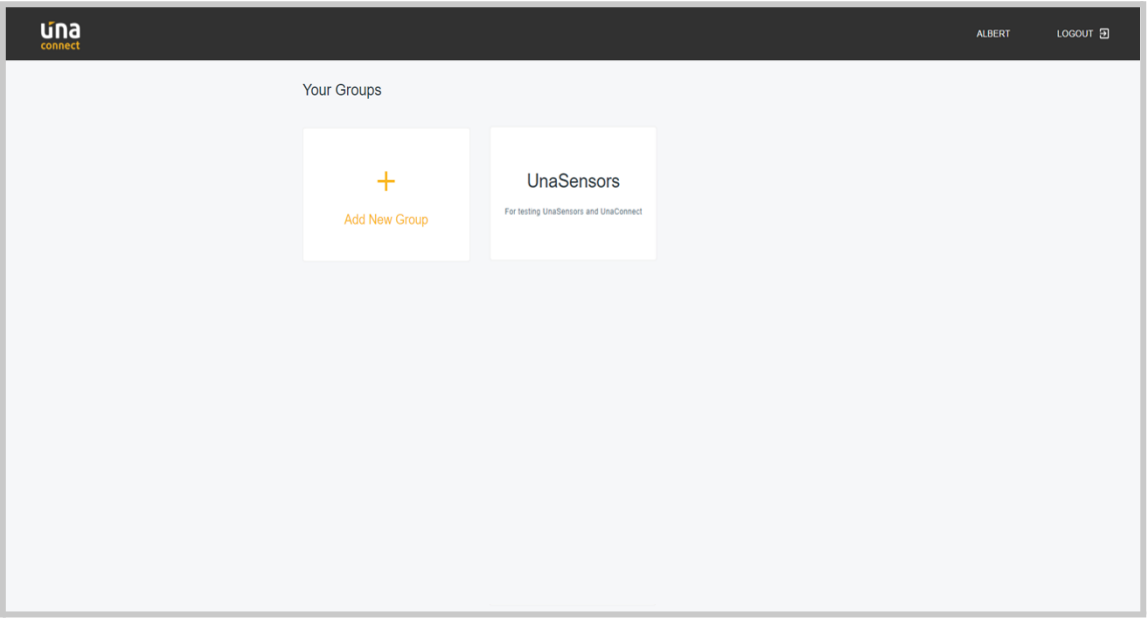
4.2 Receive the First Data Message

The **UnaConnect IoT Device Management Cloud Platform** can be used to monitor all the data received and configure the behavior of the UnaBell LTE-M devices:

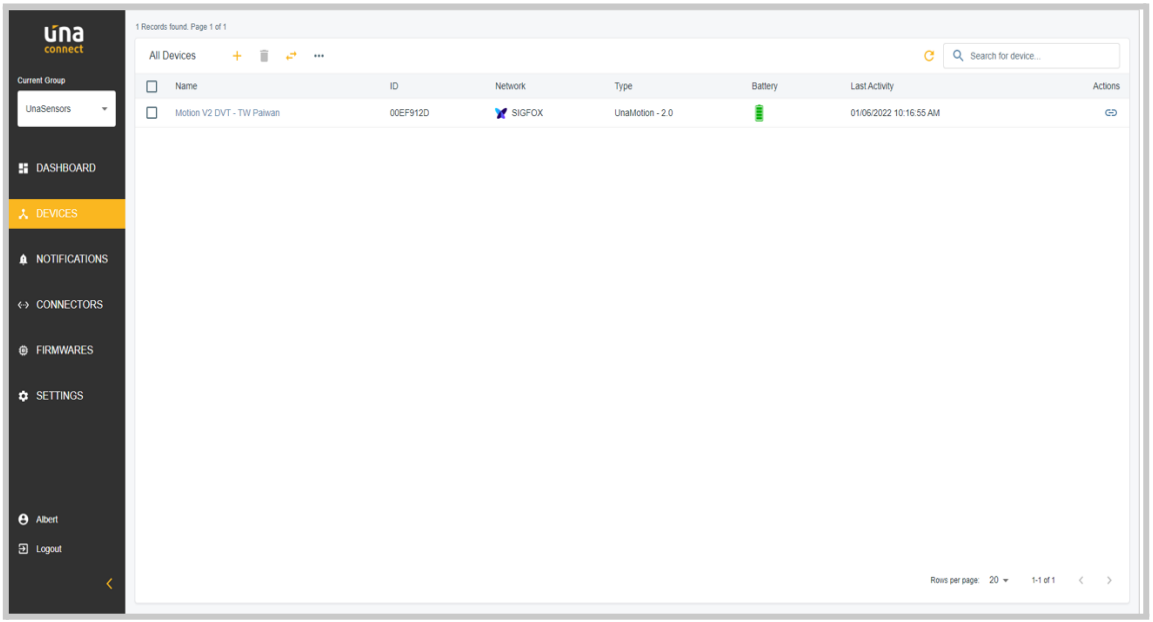
1. Open UnaConnect IoT Device Management Cloud Platform on your browser.
2. Login using the Email and Password previously provided by UnaBiz.



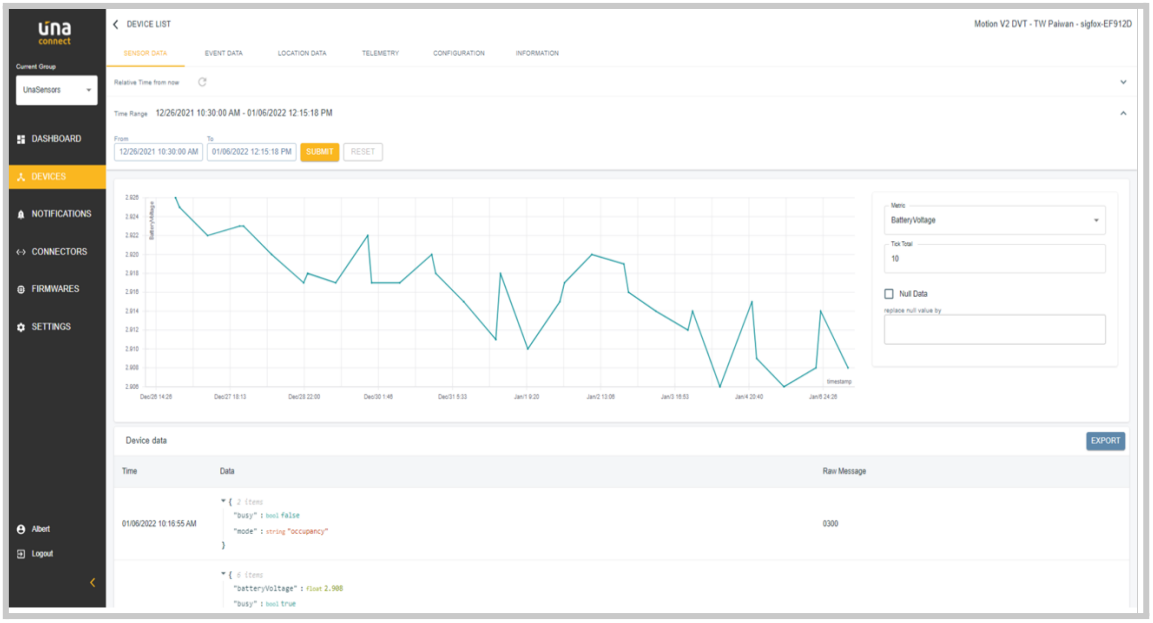
3. Click on the **Device Group** containing your UnaBell LTE-M devices that has been set up previously on the UnaConnect Platform.



4. Click on **Devices** tab on the left to view the list of devices within the Device Group.



5. Click on the **Device Name** and click on the **Sensor Data** tab on the top to view the data of each message sent from the device to the UnaConnect Platform.



5. Manage Your Data & Devices on UnaConnect

5.1 Overview

UnaBell LTE-M is seamlessly integrated with **UnaConnect**, a secure and reliable IoT Device Management Cloud Platform, to quickly setup to collect geolocation, temperature or impact data to optimize asset utilization rates and provide insights on your operations.

The UnaConnect platform lets you deploy, maintain, and integrate an unlimited number of connected devices into your enterprise system with ease. By alleviating the technical burden of managing a massive fleet of devices you can focus on what matters for your business.

Key features of the UnaConnect platform include:

- **Tech Agnostic**: UnaConnect seamlessly integrates diverse device types regardless of network protocols and deliver the right data format to respective end platforms.
- **Secure & Reliable**: UnaConnect ensures data integrity around users, devices, data connectors and data policies. The entire process is *ISO/IEC 27001:2013 certified*.
- **Flexible & Scalable**: UnaConnect lets you manage an unlimited number of devices with ease and configure devices at a granular or group level.
- **Accelerate Go-To-Market**: UnaConnect simplifies device management & provides ready-to-use add-on features that are specific to various use cases accelerating your GTM.

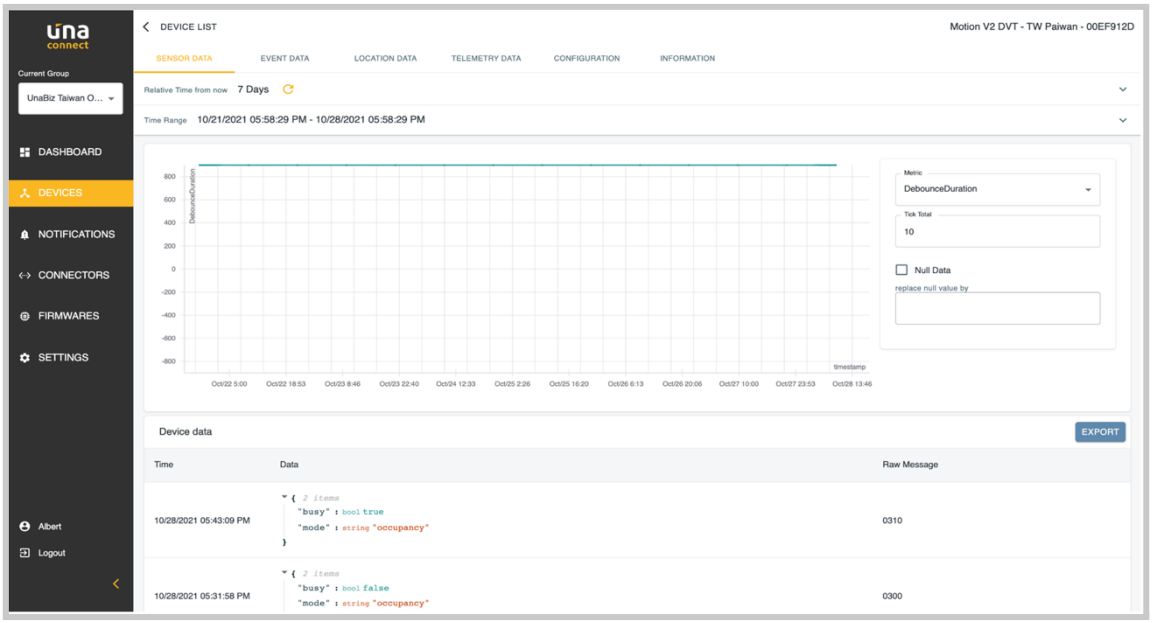
The UnaBell LTE-M devices installed in your facilities send messages to UnaConnect through the LTE-M network. The following section outlines the main types of data that you will be able to receive and the configurations that can be defined on UnaConnect and updated to your devices.

5.2 Devices

To view all the data messages sent from a single device to UnaConnect, or to edit/update the configuration and information of a single device:

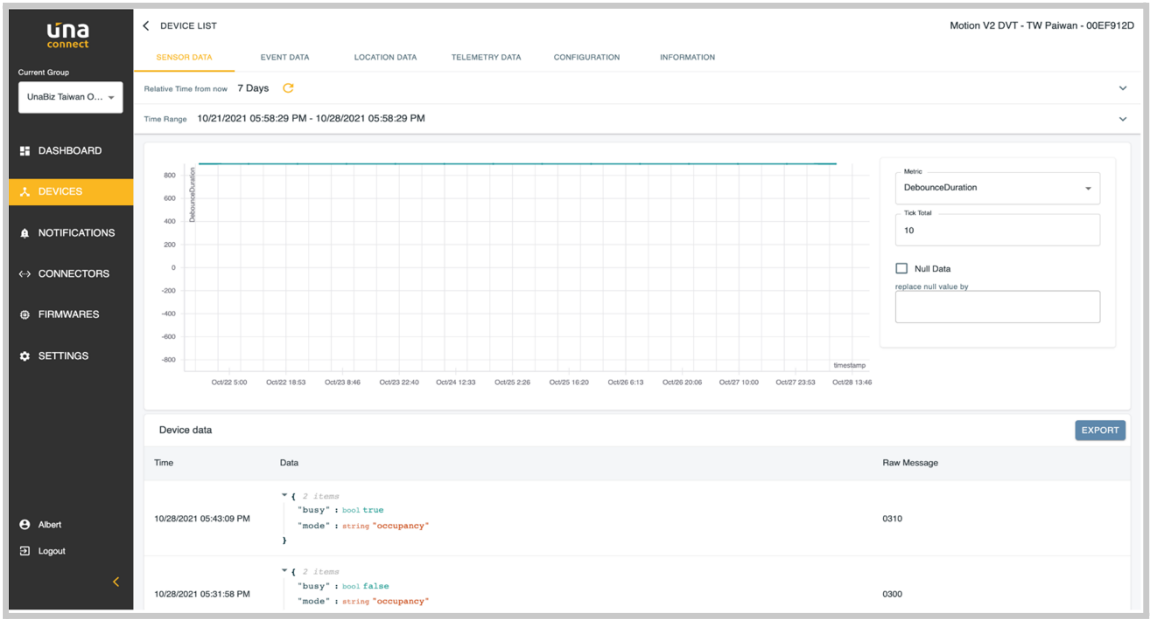
1. On the left navigation bar, click on the **Devices** tab, and the Devices page is displayed.
2. In the All Devices section, click on the device name that you want to view or edit, you will land in the **Device Data & Configuration** page for the individual device with several tabs on the top of the page to display different data types sent from the device. The default tab is the **Sensor Data** tab.

3. To view the data in the time of interest, you can click on the **Relative Time** from now section and click on the relative time buttons to load the data for the selected times.
4. You may also toggle the **Auto Refresh (1min)** to auto refresh for the latest data, or click on the refresh button anytime to manually trigger a refresh for the latest data.
5. Another option to see the data in the time of interest is to click on the **Time Range** section, select the from and to dates then click the *Submit* button to load the data for the selected times.



5.2.1 Sensor Data

The **Sensor Data** tab is the main tab that displays all the messages containing raw data that have been sent from the device. The messages are transmitted from UnaBell LTE-M device over the LTE-M network to the UnaConnect platform. UnaConnect then aggregates and translates the raw data (in a format defined by the device payload) into variables and values. For example: timestamp and click data of the UnaBell LTE-M device.



In the **Graph** section:

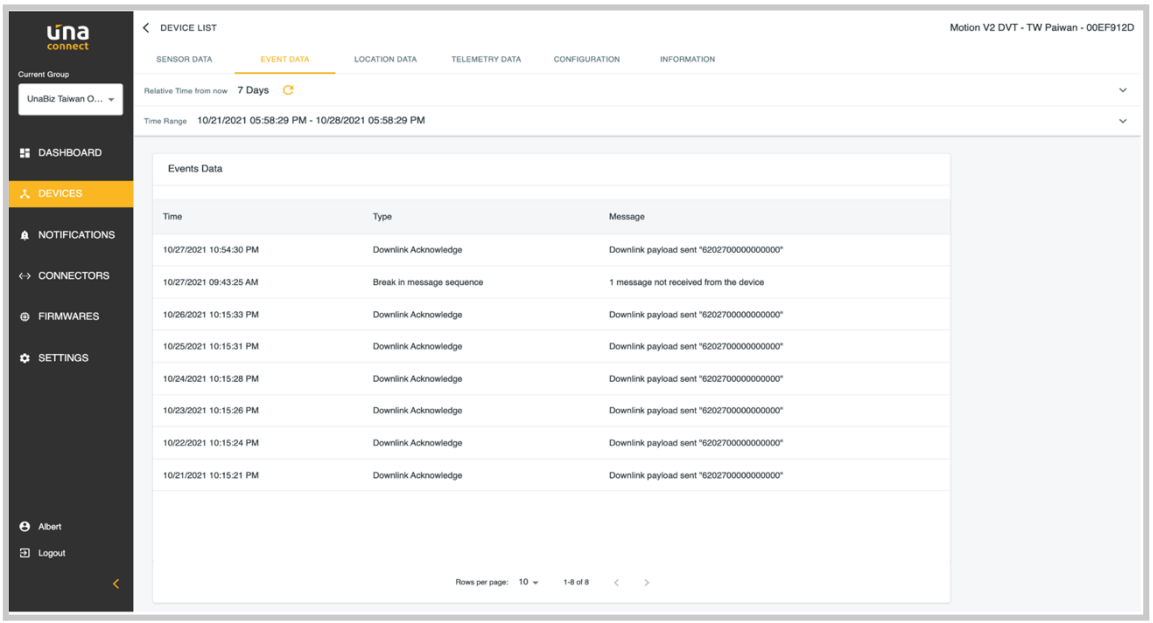
1. Click on the **Metrics** dropdown menu to select the data types that you want to visualize.
2. Enter the **Tick Total value** to change the scale of the horizontal axis.
3. If you want to replace null value by other values, click on the *Null Data checkbox* and enter the value to replace null.

In the **Device data** section:

1. The table displays the *timestamp* of each message, the data contained in each message that have been processed or translated by UnaConnect, and the raw data in the message sent from the device.
2. The data and raw messages are based on the UnaBell LTE-M device type, modes and events that triggered each of the messages to be sent from the device.
3. Click on the **Export** button to export a *CSV file* of all the sensor data messages sent from the device.

5.2.2 Event Data

The **Event Data** tab displays all the messages containing descriptions of the events that are available to UnaBell LTE-M such as downlink messages, downlink acknowledgement messages, network error messages along with the timestamp of these events.



In the **Events data** section, the table displays the timestamp of each message, the type of event message such as downlink, downlink acknowledgement or network error messages etc., and the data contained in the message as processed or translated by UnaConnect.

5.2.3 Location Data

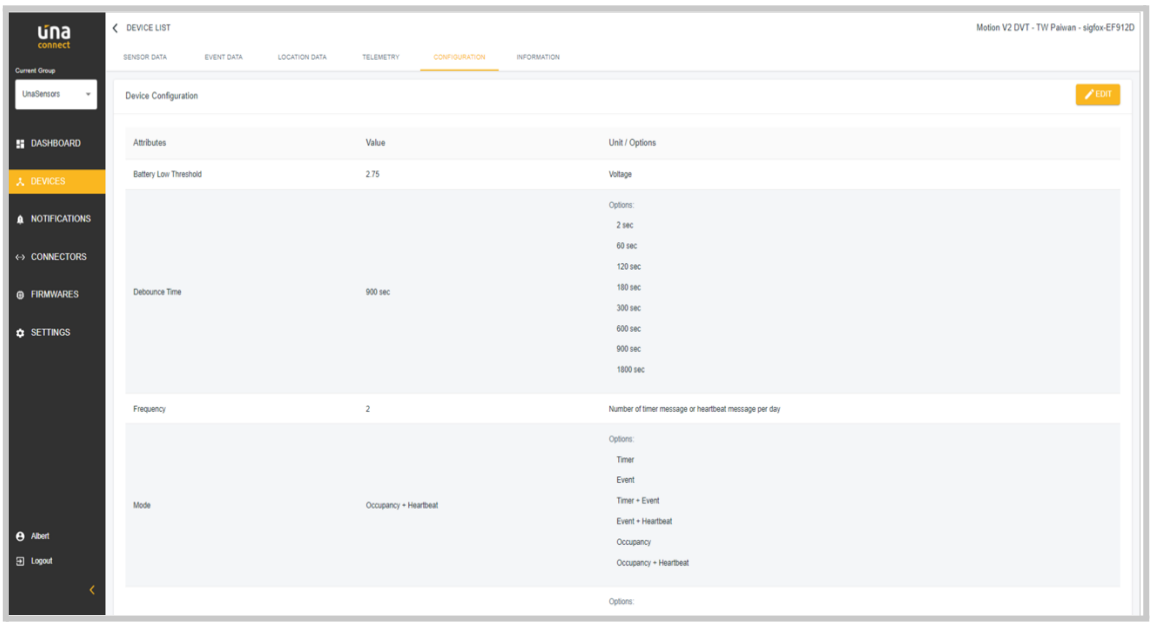
The **Location Data** tab displays all the messages containing the coordinates (latitude, longitude and the radius of precision) for the location of the device with its timestamps. *This feature is not supported by the UnaBell LTE-M device type.*

5.2.4 Telemetry Data

The **Telemetry Data** tab displays the messages containing the quality of the signal. *This feature is not supported by the UnaBell LTE-M device type.*

5.2.5 Configuration

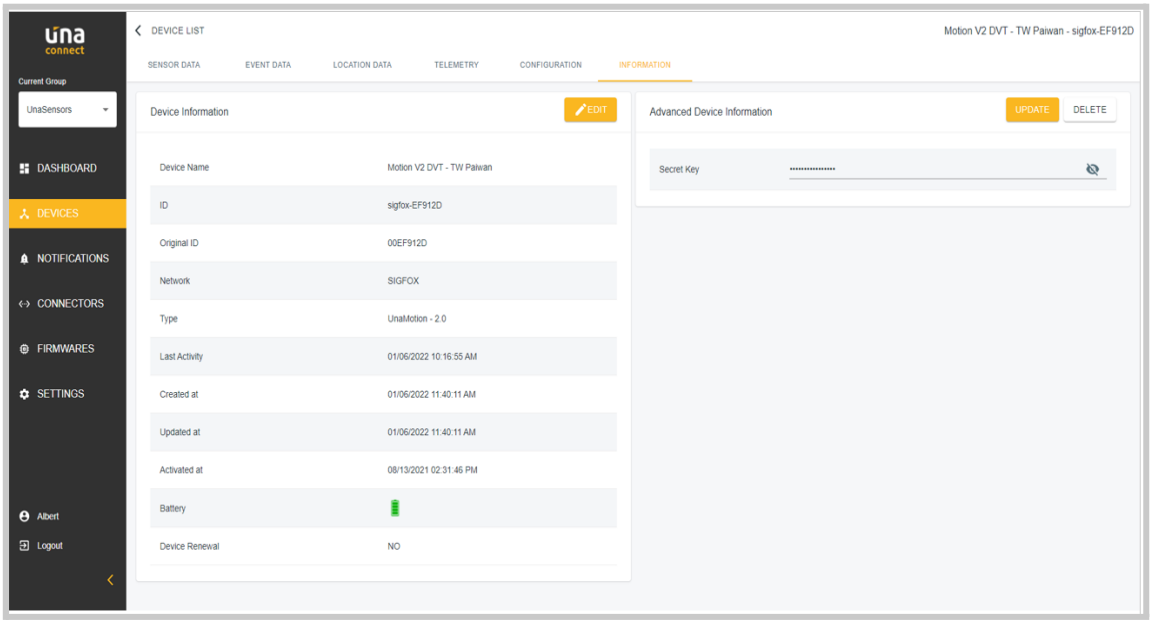
In the **Configuration** tab, you can view or edit the set of configurable parameters that defines the frequency, condition and data of the messages sent from the device. The set of configurable parameters are based on the UnaBell LTE-M device type. The parameters for UnaBell LTE-M are outlined in Section 4.1 Configuration Parameters.



1. In the **Device Configuration** section, click on the *Edit* button on the top right to switch to the edit mode.
2. In the edit mode, fields, dropdown menus and buttons will appear for each of the attributes that may be edited. Please refer to the unit and options for each of the attribute as outlined on the page in edit mode to complete the configuration.
3. Click on the *Done* button to save and apply the changes.

5.2.6 Information

In the **Information** tab, you can view information about the UnaBell LTE-M device including device name, device type, activation date, last activity date, its battery level indicator and a renewal toggle.



1. In the **Device Information** section, click on the *Edit* button on the top right to switch to the *edit mode*.
2. In the edit mode, fields, dropdown menus and buttons will appear for the items such as device name and device type, which may be edited.
3. Click on the *Done* button to save and apply the changes.

6. Firmware Over-the-Air (FOTA) for UnaBell LTE-M

6.1 FOTA Overview

This section provides an overview of the **Firmware Over-the-Air (FOTA)** process and the tasks executed in between the device and the UnaConnect platform. You may skip to the next sections for instructions on updating the firmware for UnaBell LTE-M.

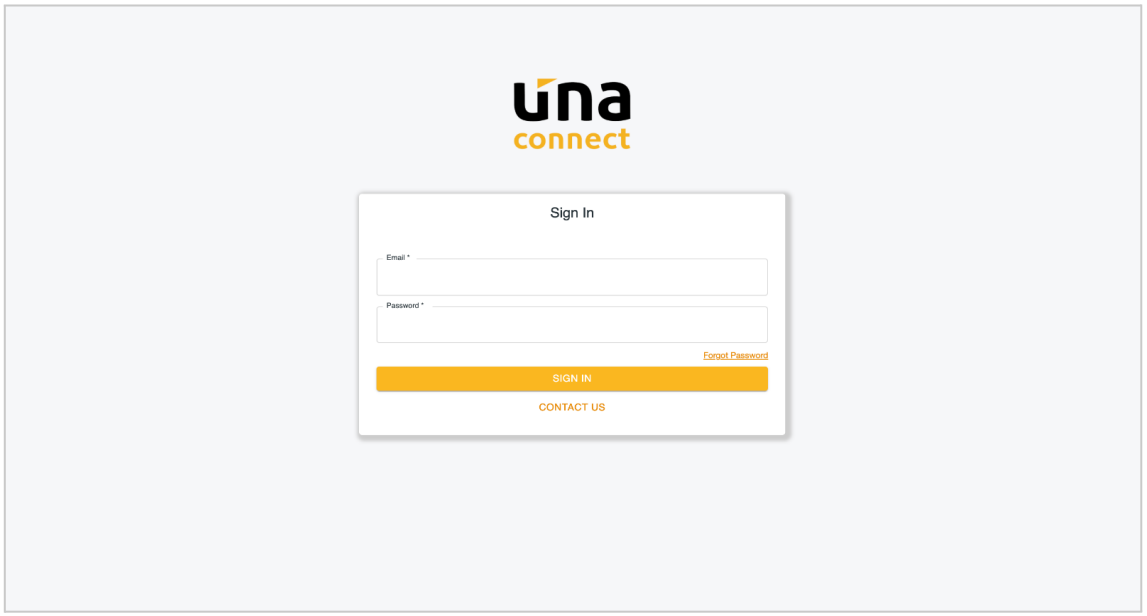
During the **FOTA** process, the following tasks will be executed:

1. In a typical downlink process, UnaConnect sends a downlink configuration to the device, which includes a *FOTA command* that can be set by the user.
2. If the command is set as *FOTA*, then upon receiving the downlink from UnaConnect, UnaBell LTE-M will initiate the FOTA process.
3. UnaBell LTE-M sends its **Device ID** and **firmware version** to the UnaConnect platform, which checks the device type and firmware version. If it finds that a newer firmware is available on the platform, it informs the device to proceed to the next step.
4. UnaBell LTE-M sends a *request for firmware file* message to UnaConnect, which responds by sending the new firmware file to the device over the local LTE-M network.
5. After UnaBell LTE-M checks that the complete file has been received, it starts to install the new firmware.
6. After the firmware has been successfully installed by the device, UnaBell LTE-M sends a status message to UnaConnect to confirm its firmware version.

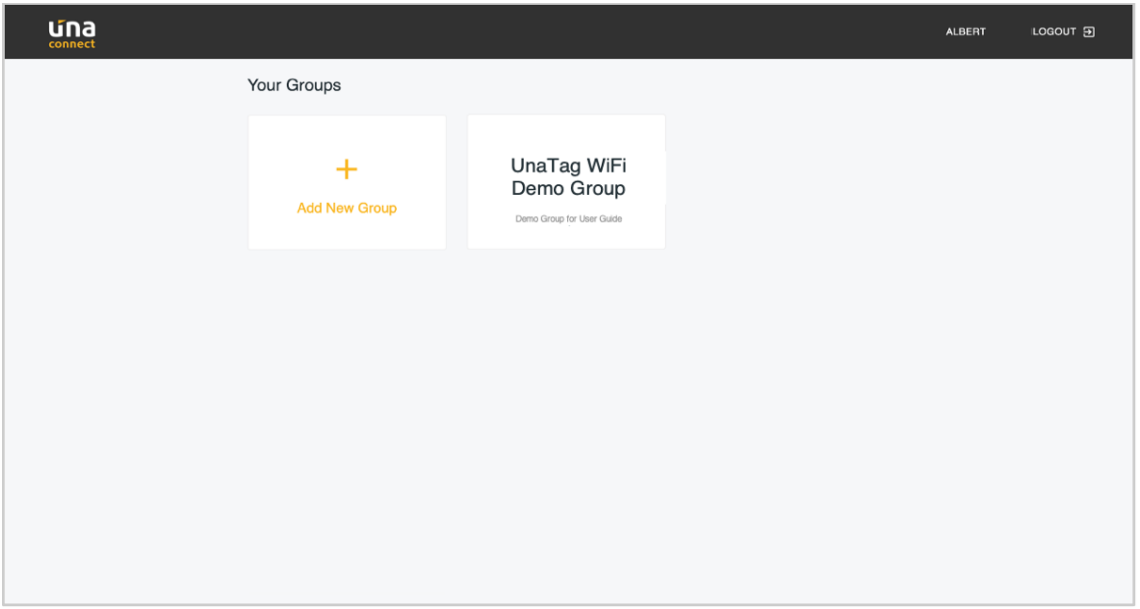
6.2 Update Firmware on UnaBell LTE-M

To update the firmware on your UnaBell LTE-M device, the *new firmware file provided by UnaBiz* will need to be added on UnaConnect at https://console.unaconnect.io/.

1. Login to the UnaConnect platform with the credentials provided by UnaBiz.

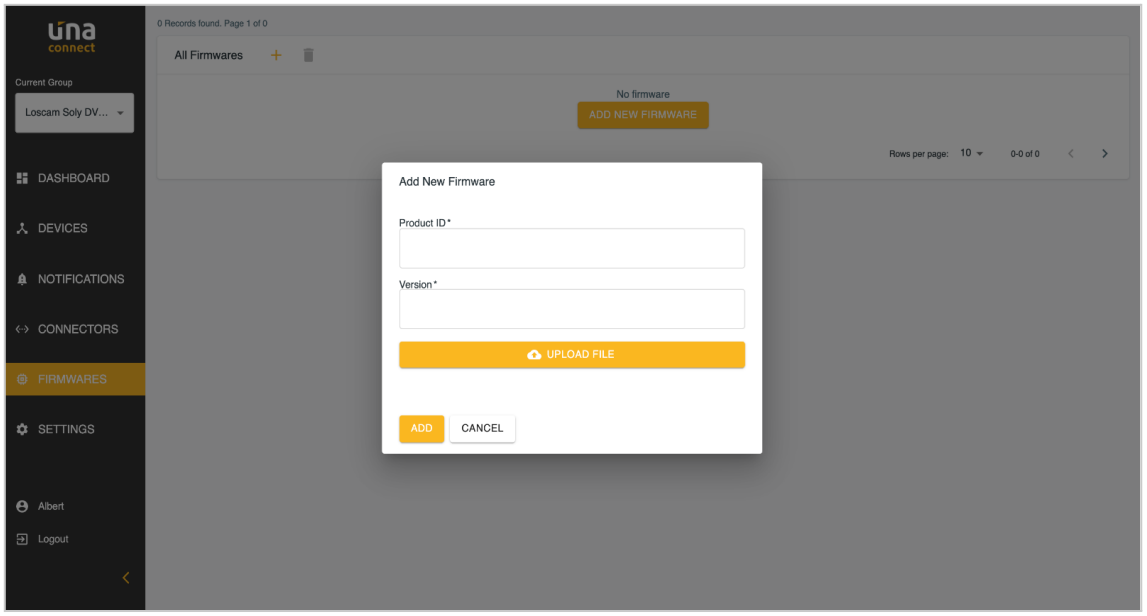


2. Click on the **Device Group Name** to be deployed with the new firmware file.

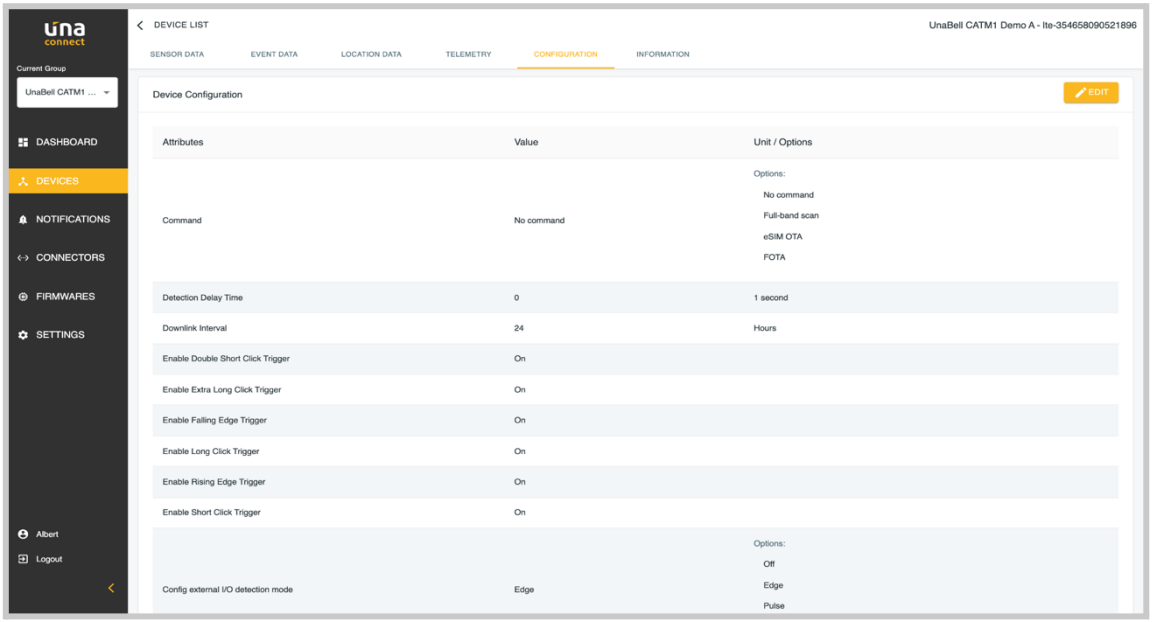


3. Click on the **Firmwares** tab on the menu on the left, then click on the + *add* or *Add New Firmware* button, fill in the *Product ID* (**100B** for UnaBell LTE-M) and *Version* as provided by UnaBiz.

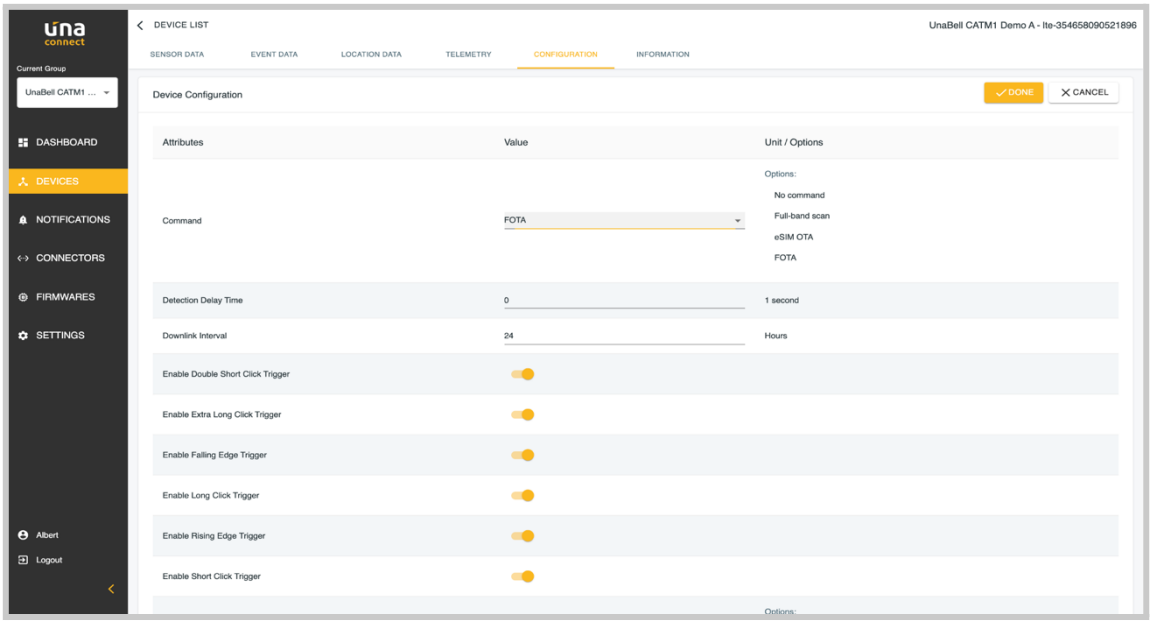
4. Click on *Upload File* button and select the firmware bin file developed by UnaBiz, then click on the *Add* button to upload the firmware file to the UnaConnect platform.



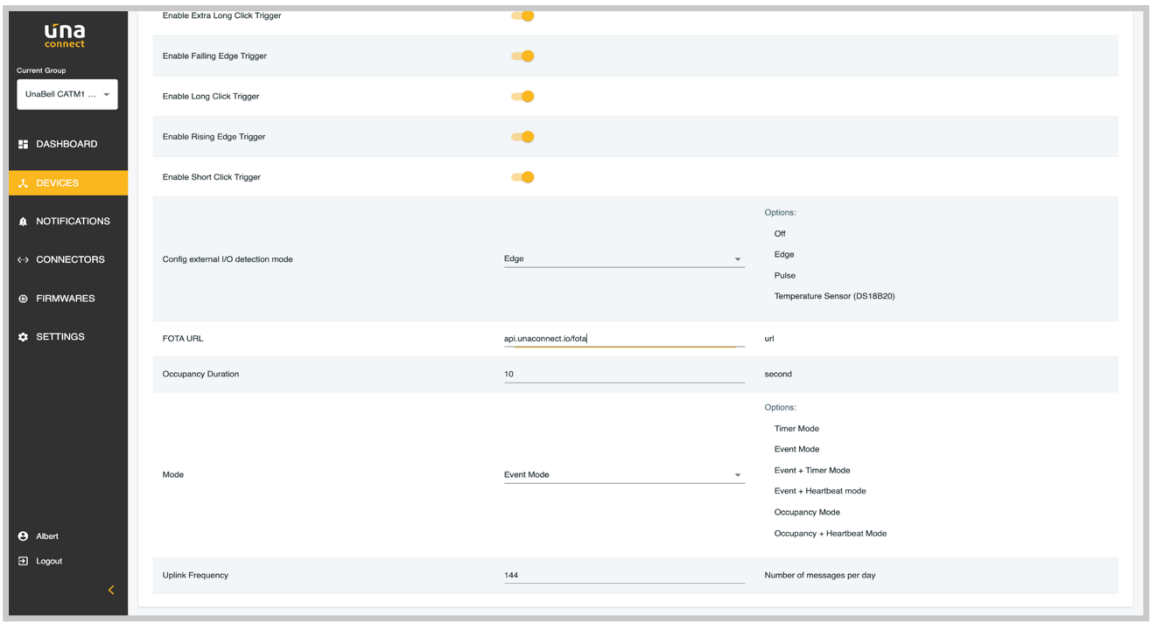
5. Click on the **Devices** tab on the menu on the left, click on the device name, then click on the **Configuration** tab on the top of the page.



6. Click on the *Edit* button on the top right corner, then select **FOTA** in the command parameter.



7. Check that the *FOTA URL* is correct. If you are using UnaConnect to perform the firmware update, then the URL is: **api.unaconnect.io/fota**.



8. Click on the *Done* button on the top right corner to confirm the setting.
9. After the above steps have been completed on the UnaConnect cloud platform, *UnaBell LTE-M will conduct the FOTA process when it performs its next scheduled downlink*, or you may wish to *manually trigger a downlink (by resetting the device or unplug and replug the batteries)*.

To check if the UnaBell LTE-M device has completed the FOTA process in its scheduled downlink, you can click on the **Devices** tab on the menu on the left, click on the *device name*, then click on the **Information** tab on the top of the page. Then check that the *Firmware version* of the device has been updated to the new Firmware version number. If it remains as the previous Firmware version number, then the FOTA process has not been successful and you may retry the steps above.

Please take note of the following measures designed to ensure that all devices are aligned and updated to the same and latest firmware:

- When multiple firmware files are uploaded on UnaConnect, **the latest or newest firmware version will be used for FOTA.**
- After the firmware has been updated on the device, **any firmware version that is older than the device firmware cannot be updated to the device (and no back track is available).**

EU Declaration of Conformity

This device complies with the essential requirements of the Radio Equipment directive: 2014 / 53 / EU. The following test methods have been applied in order to prove presumption of conformity with the essential requirements of the Radio Equipment directive: 2014/53/EU:

EN 301 908-13 V13.1.1

EN 301 908-1 V15.1.1

EN IEC 62311:2020

EN 50665: 2017

EN 50385: 2017

EN 301 489-1 V2.2.3

EN 301 489-52 V1.2.1

EN IEC 62368-1:2020

Cat M1	Power (dBm)
Band 3	23
Band 8	23
Band 20	23
Band 28	23

SW version: V2116

RF exposure statement

The minimum distance between the user and/or any bystander and the radiating structure of the transmitter is 20cm.