

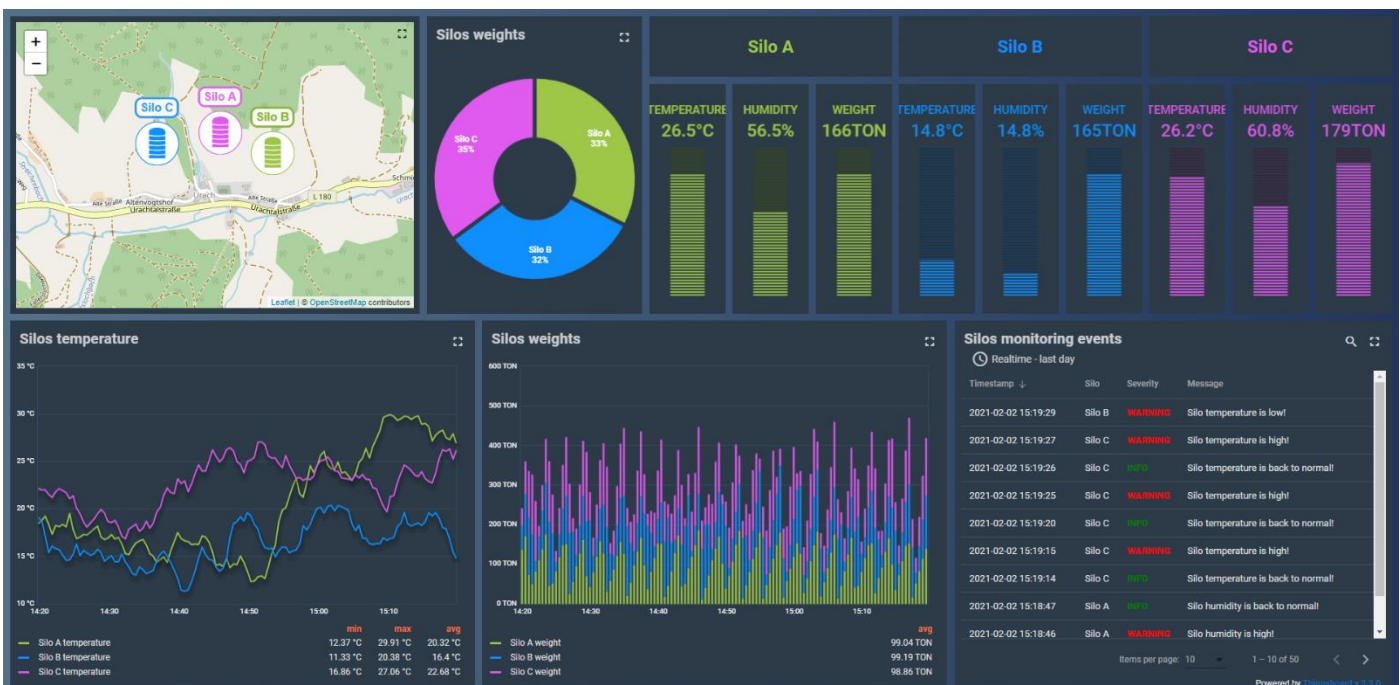
CONNECTING SENQUIP DEVICES TO THE THINGSBOARD

1. Introduction

This Application Note details how to integrate Senquip telemetry devices with the ThingsBoard using MQTT. Senquip devices and the ThingsBoard also support HTTP, but this will not be considered in this application note.

ThingsBoard is an open-source IoT platform for data collection, processing, visualisation, and device management. It enables device connectivity via industry standard IoT protocols MQTT and HTTP and supports both cloud and on-premises deployments. ThingsBoard combines scalability, fault-tolerance, and performance so you will never lose your data.

MQTT stands for Message Queuing Telemetry Transport and is a lightweight, publish-subscribe network protocol that transports messages between devices. Data will be transmitted in JSON format from the Senquip device to the ThingsBoard. JSON (JavaScript Object Notation) is an open data interchange format that uses human-readable text to store and transmit data objects consisting of key value pairs.



2. Device and ThingsBoard Configuration

This section outlines how to configure a Senquip device to communicate with ThingsBoard over MQTT. It is assumed that the user has created an account on the Senquip Portal to allow device configuration and has an account on the ThingsBoard. ThingsBoard can be accessed at <https://thingsboard.cloud/>.

1. In ThingsBoard, navigate to *Device Groups* and expand the group as shown in Figure 1.

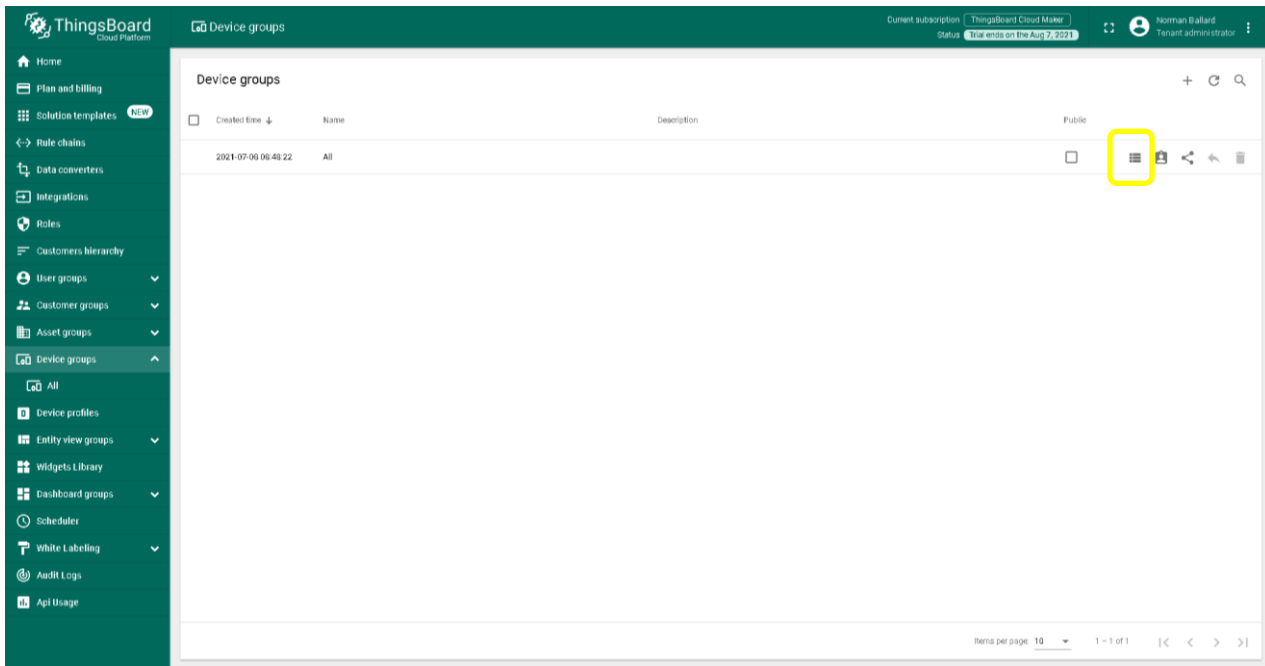


Figure 1 - Device Groups

2. If this is the first device being added to the *Device Group*, there will be no entries shown. Press the “+” button as shown in Figure 2 to add a device to the selected group.

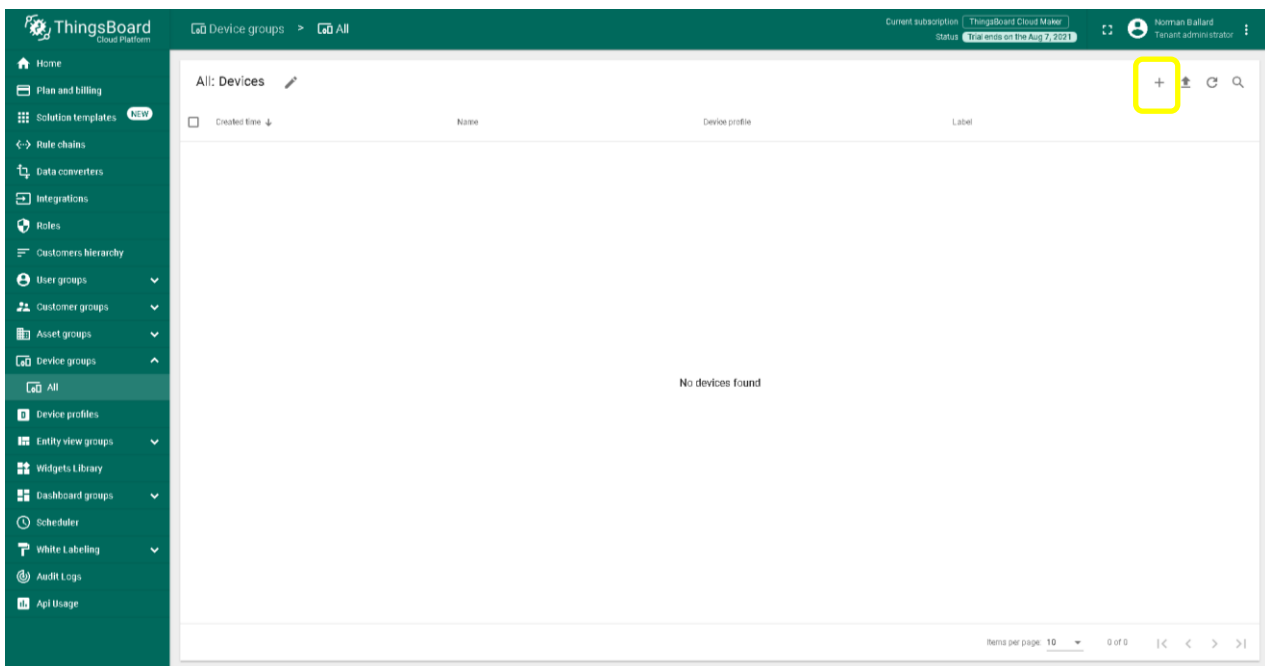


Figure 2 - Create a Device

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- Give the device a name, a label that will appear on the maps widgets, and select “MQTT” as the *Transport type*. Press *Next: Credentials* to continue and follow this guide from step 5.

In later versions of ThingsBoard, the *Transport type* option has been removed and has been split out to enable the creation of custom transports. If this is the case, select *Create new device profile* and give the profile a name; “My MQTT Transport” in this example. Press *Next: Transport Credentials*.

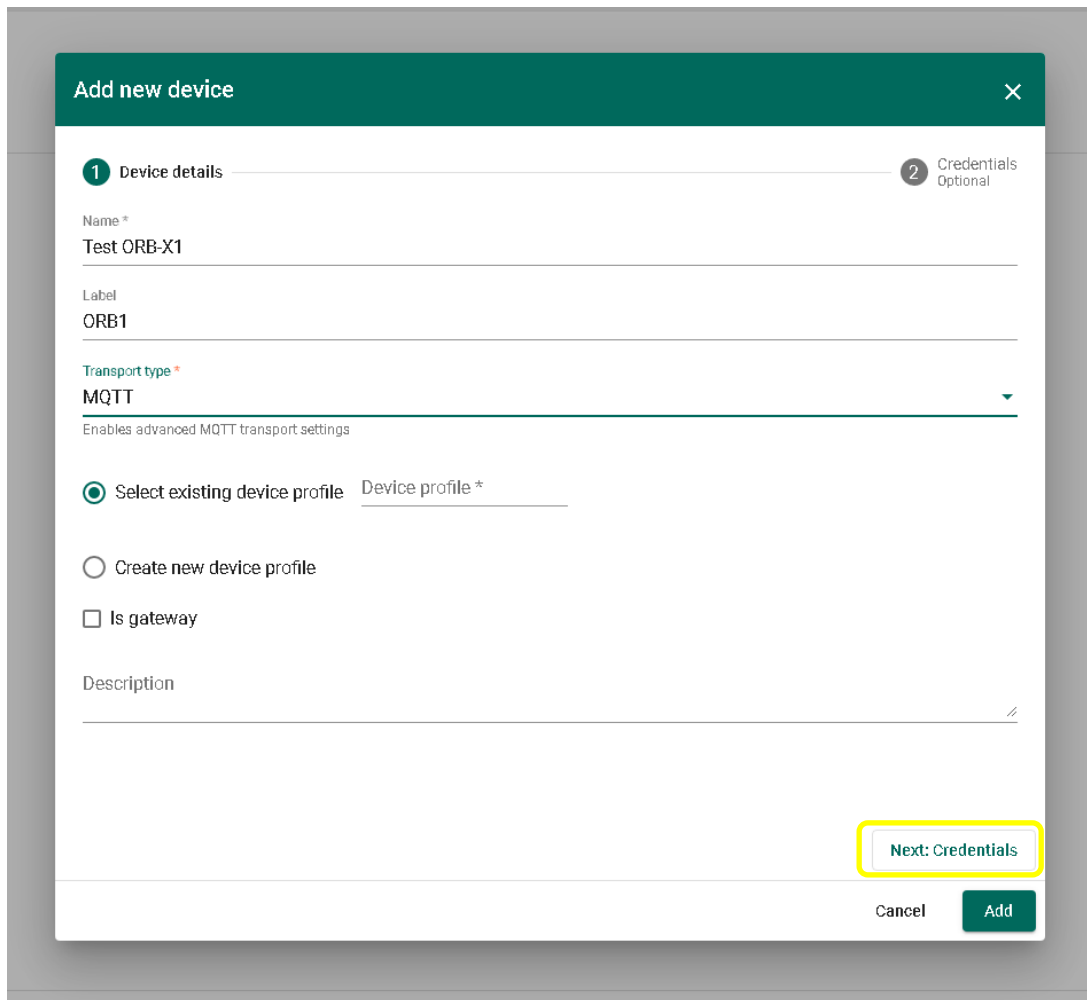
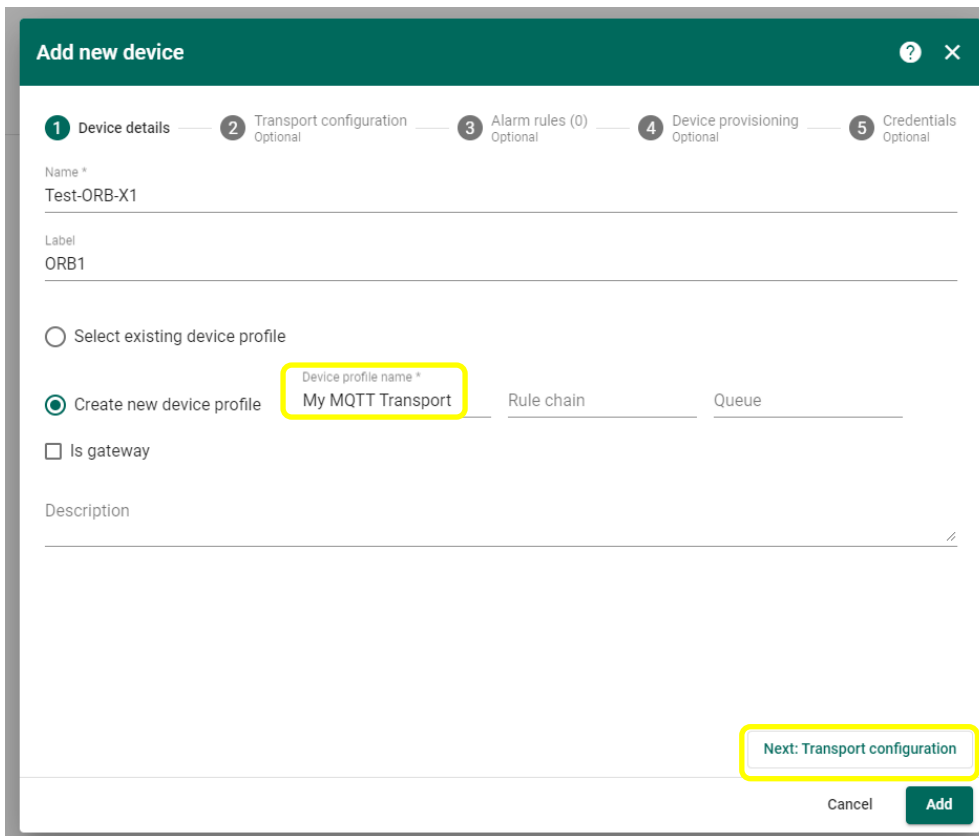


Figure 3 - Device Detail – Traditional ThingsBoard



Add new device ? X

1 Device details — 2 Transport configuration Optional — 3 Alarm rules (0) Optional — 4 Device provisioning Optional — 5 Credentials Optional

Name *
Test-ORB-X1

Label
ORB1

Select existing device profile

Create new device profile

Device profile name *
My MQTT Transport

Rule chain

Queue

Is gateway

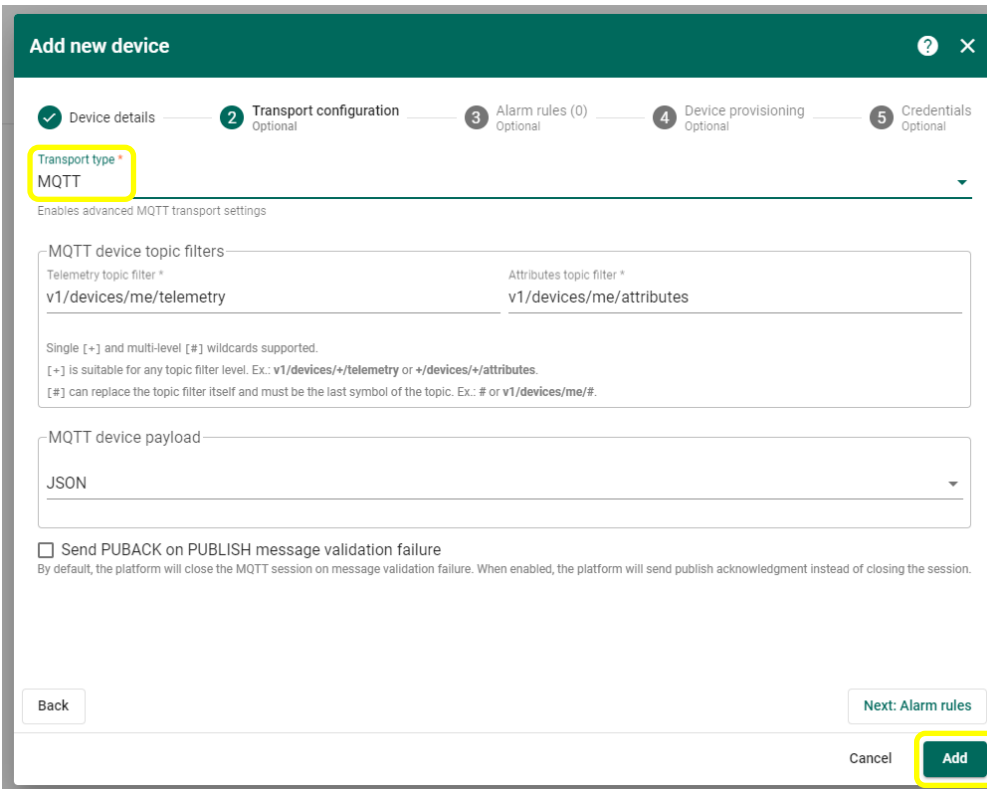
Description

Next: Transport configuration

Cancel Add

Figure 4 - Device Detail – Newer Versions of ThingsBoard

4. Select “MQTT” as the *Transport type* and press *Add*. You have now created a new device and a new Transport type that can be used with further devices.



Add new device

1 Device details ✓ 2 Transport configuration Optional 3 Alarm rules (0) Optional 4 Device provisioning Optional 5 Credentials Optional

Transport type *
MQTT

Enables advanced MQTT transport settings

MQTT device topic filters

Telemetry topic filter *	Attributes topic filter *
v1/devices/me/telemetry	v1/devices/me/attributes

Single [+] and multi-level [#] wildcards supported.
[+] is suitable for any topic filter level. Ex: v1/devices/+/telemetry or +/devices/+/attributes.
[#] can replace the topic filter itself and must be the last symbol of the topic. Ex: # or v1/devices/me/#.

MQTT device payload
JSON

Send PUBACK on PUBLISH message validation failure
By default, the platform will close the MQTT session on message validation failure. When enabled, the platform will send publish acknowledgment instead of closing the session.

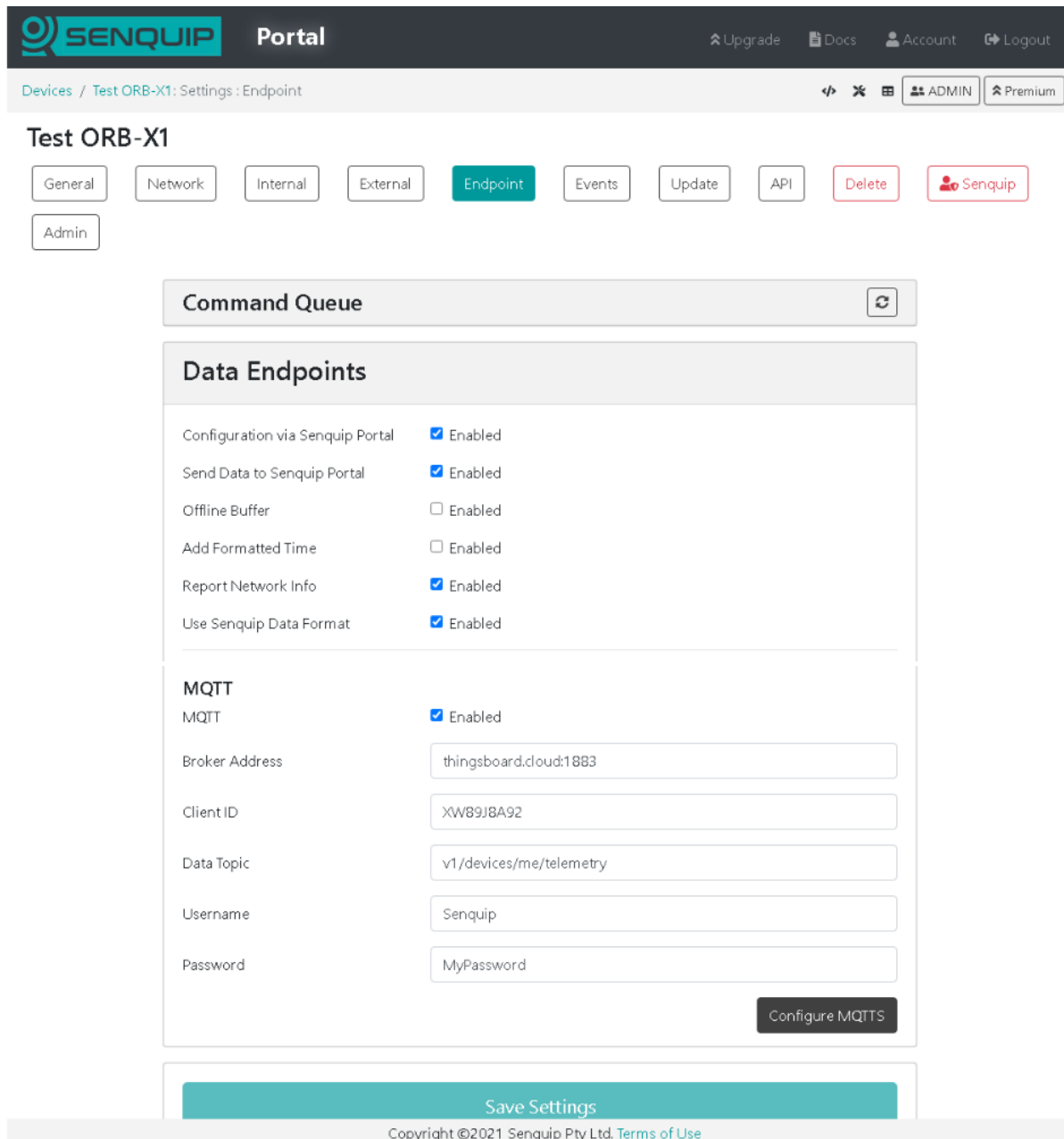
Back Next: Alarm rules Cancel **Add**

Figure 5 - Complete creation of Transport Type

- Configure the Senquip telemetry device to send data to the ThingsBoard by configuring the device endpoint on the Senquip Portal. Using the Endpoint settings, as shown in Figure 6, Enable MQTT as the transport, use a *Broker Address* of thingsboard.cloud:1883 and a *Data Topic* of v1/devices/me/telemetry. Choose a *Client ID*, *Username* and *Password*. In this instance, we used the Senquip Device ID as a Client ID. Remember to save the settings before exiting the page.

The Senquip device will now send data to the configured endpoint. It will however also continue to send data to the Senquip Portal. If you would like to stop sending data to the Senquip Portal, uncheck the *Send Data to the Senquip Portal* option. You can also disable Configuration via the Senquip Portal but this will prevent any further configuration from being performed remotely via the Senquip Portal and is not recommended.

Without access to the Senquip Portal, configuration can also be performed using the webserver on the Senquip device.



Senquip Portal Upgrade Docs Account Logout

Devices / Test ORB-X1: Settings : Endpoint ADMIN Premium

Test ORB-X1

General Network Internal External **Endpoint** Events Update API Delete Senquip Admin

Command Queue

Data Endpoints

- Configuration via Senquip Portal Enabled
- Send Data to Senquip Portal Enabled
- Offline Buffer Enabled
- Add Formatted Time Enabled
- Report Network Info Enabled
- Use Senquip Data Format Enabled

MQTT

- MQTT Enabled
- Broker Address: thingsboard.cloud:1883
- Client ID: XW89J8A92
- Data Topic: v1/devices/me/telemetry
- Username: Senquip
- Password: MyPassword

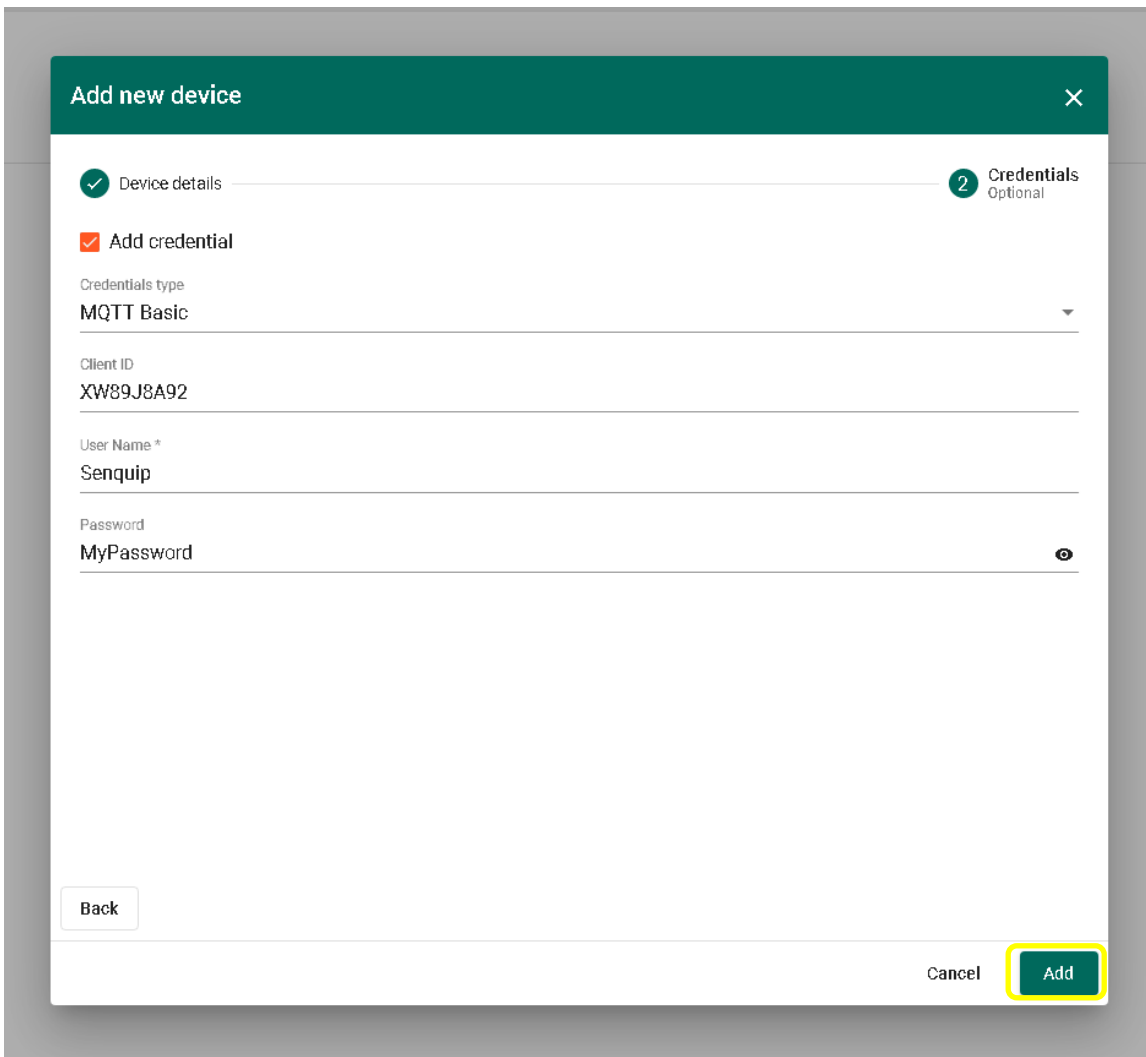
Configure MQTTs

Save Settings

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Figure 6 - Setting up the Senquip Endpoint

- On the ThingsBoard, tick *Add Credentials* or *Manage Credentials* on some versions, choose a credential type of “MQTT Basic” and fill in the *Client ID*, *User Name*, and *Password* that were entered in the previous step on the Senquip device Endpoint page. Press *Add*.



The screenshot shows a web form titled "Add new device" with a close button (X) in the top right corner. The form is divided into two sections: "1 Device details" (marked with a green checkmark) and "2 Credentials" (marked with a green circle and labeled "Optional"). Under "Add credential", there are four input fields: "Credentials type" (a dropdown menu set to "MQTT Basic"), "Client ID" (containing "XW89J8A92"), "User Name" (containing "Senquip"), and "Password" (containing "MyPassword" with a toggle icon). At the bottom left is a "Back" button, and at the bottom right are "Cancel" and "Add" buttons, with the "Add" button highlighted by a yellow border.

Figure 7 - MQTT Details

7. The newly added device will now appear in the the selected group. Select the device and choose *Latest Telemetry* to see the data arriving. Each key value pair in the Senquip raw data packet will be received by the ThingsBoard and is displayed. If additional peripherals are turned on on the Sequip device, more key value pairs will be added to the JSON raw data packet and will be received by the ThingsBoard.

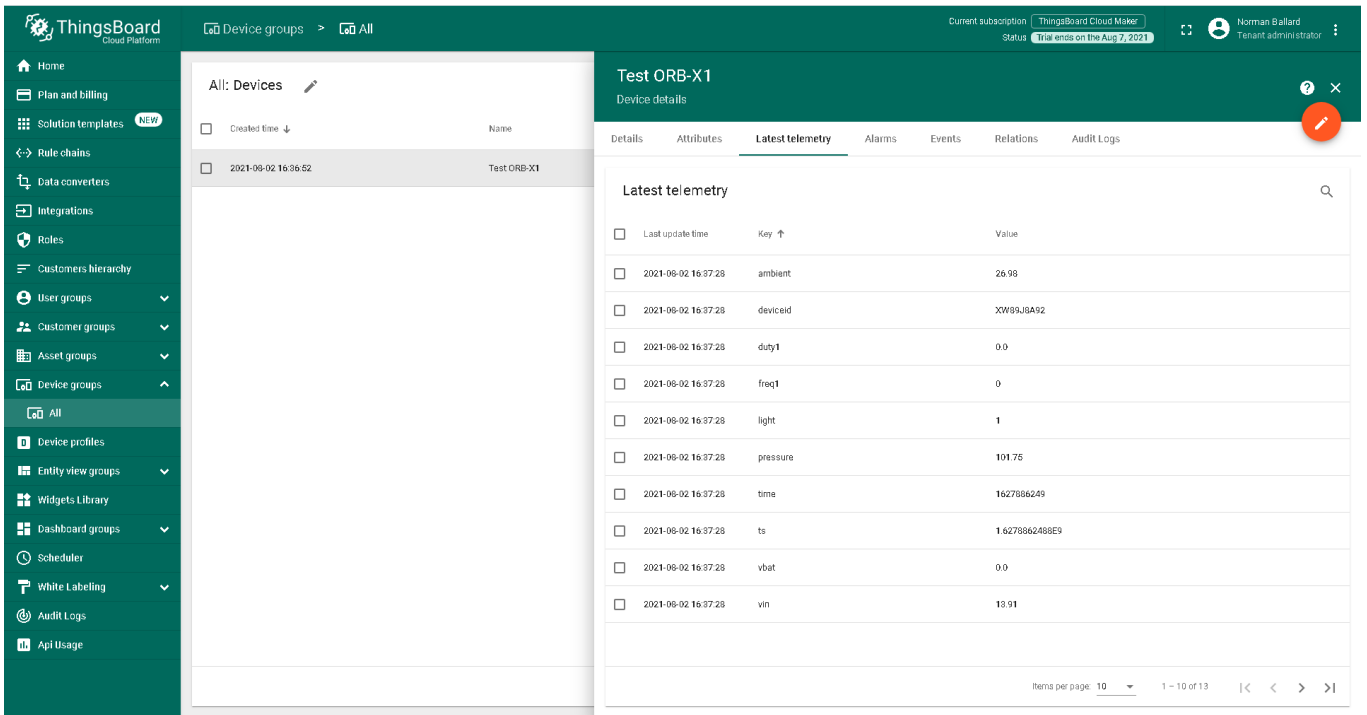
```

Raw Data

{
  "ts": 1627886268.8,
  "ambient": 27.05,
  "vbat": 0,
  "time": 1627886269,
  "wifi_rssi": -61,
  "light": 1,
  "wifi_ip": "192.168.0.194",
  "deviceid": "XW89J8A92",
  "pressure": 101.75,
  "duty1": 0,
  "vin": 13.91,
  "vsys": 3.97,
  "freq1": 0
}

02-Aug-21 16:37:46
  
```

Figure 8 - Senquip Device Data in JSON Format



The screenshot shows the ThingsBoard Cloud Platform interface. On the left is a navigation menu with options like Home, Plan and billing, Solution templates, Rule chains, Data converters, Integrations, Roles, Customers hierarchy, User groups, Customer groups, Asset groups, Device groups, Device profiles, Entity view groups, Widgets Library, Dashboard groups, Scheduler, White Labeling, Audit Logs, and Api Usage. The main area is divided into two panels. The left panel, titled 'All: Devices', shows a table with columns for 'Created time' and 'Name'. It lists one device: '2021-09-02 16:36:52' with name 'Test ORB-X1'. The right panel, titled 'Test ORB-X1 Device details', has tabs for 'Details', 'Attributes', 'Latest telemetry', 'Alarms', 'Events', 'Relations', and 'Audit Logs'. The 'Latest telemetry' tab is active, showing a table with columns for 'Last update time', 'Key', and 'Value'. The data rows are as follows:

Last update time	Key	Value
2021-09-02 16:37:28	ambient	26.98
2021-09-02 16:37:28	deviceid	XW89J8A92
2021-09-02 16:37:28	duty1	0.0
2021-09-02 16:37:28	freq1	0
2021-09-02 16:37:28	light	1
2021-09-02 16:37:28	pressure	101.75
2021-09-02 16:37:28	time	1627886269
2021-09-02 16:37:28	ts	1627886248865
2021-09-02 16:37:28	vbat	0.0
2021-09-02 16:37:28	vin	13.91

Figure 9 - Data Received on ThingsBoard

3. Visualising the Data on a Dashboard

ThingsBoard allows you to configure customisable IoT dashboards. Each IoT Dashboard can contain multiple widgets that visualise data from multiple IoT devices. Once an IoT Dashboard is created, you can assign it to multiple customers of your IoT project. In this section, we will discuss creating a very simple dashboard.

1. In the *Latest Telemetry* window, chose a key value pair using the selection box and press “Show on Widget” to associate the data with a display widget. In this example, we have chosen ambient temperature. It can be seen in Figure 10 that the current value is 27.24 degrees.

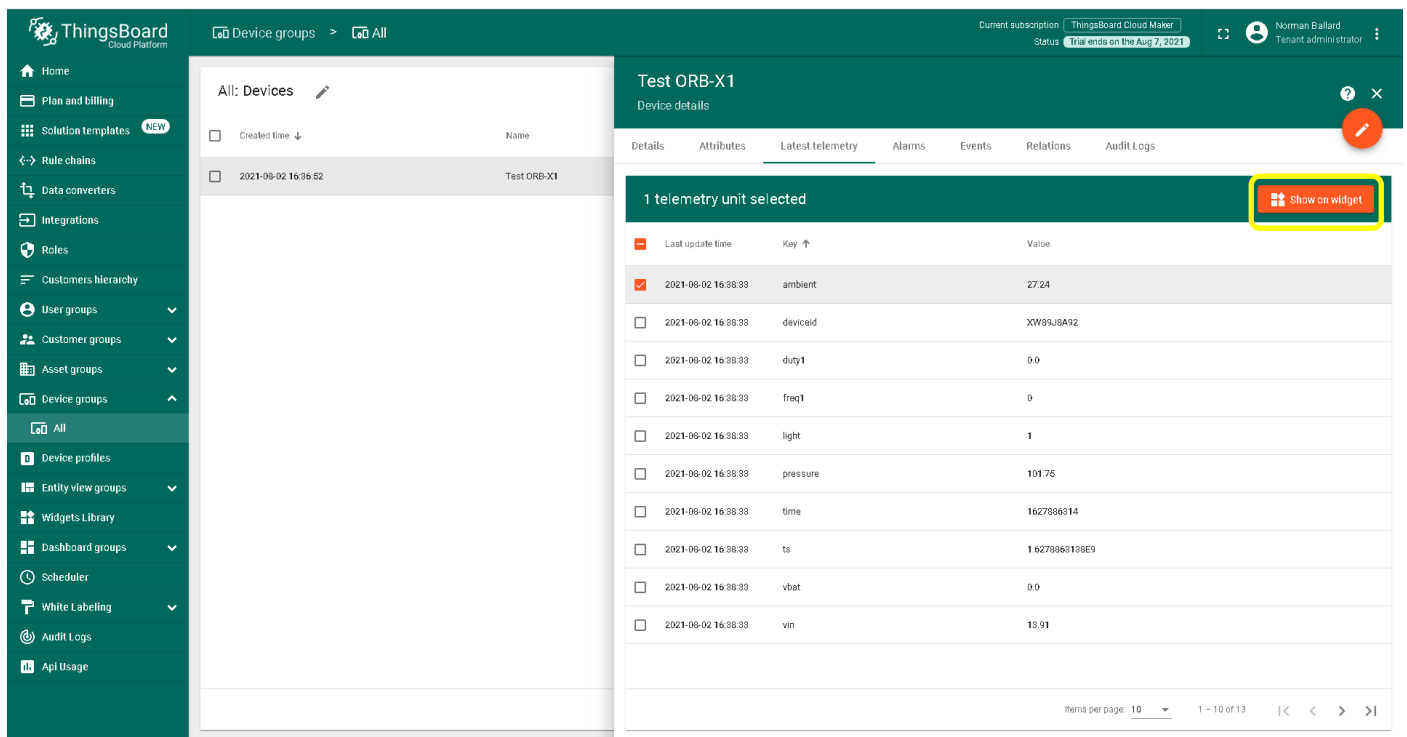


Figure 10 - Choose a Key Value Pair

2. Select the type of widget by first selecting the bundle of widgets and then the widget. Bundles of widgets include line graphs, tables, gauges and more. In this example, we have chose the *Analogue Gauges* bundle and a circular gauge. The scale, colour, font and text on the widget are completely configurable. Press “Add to Dashboard”. If this is your first dashboard, you will have to give the dashboard a name.

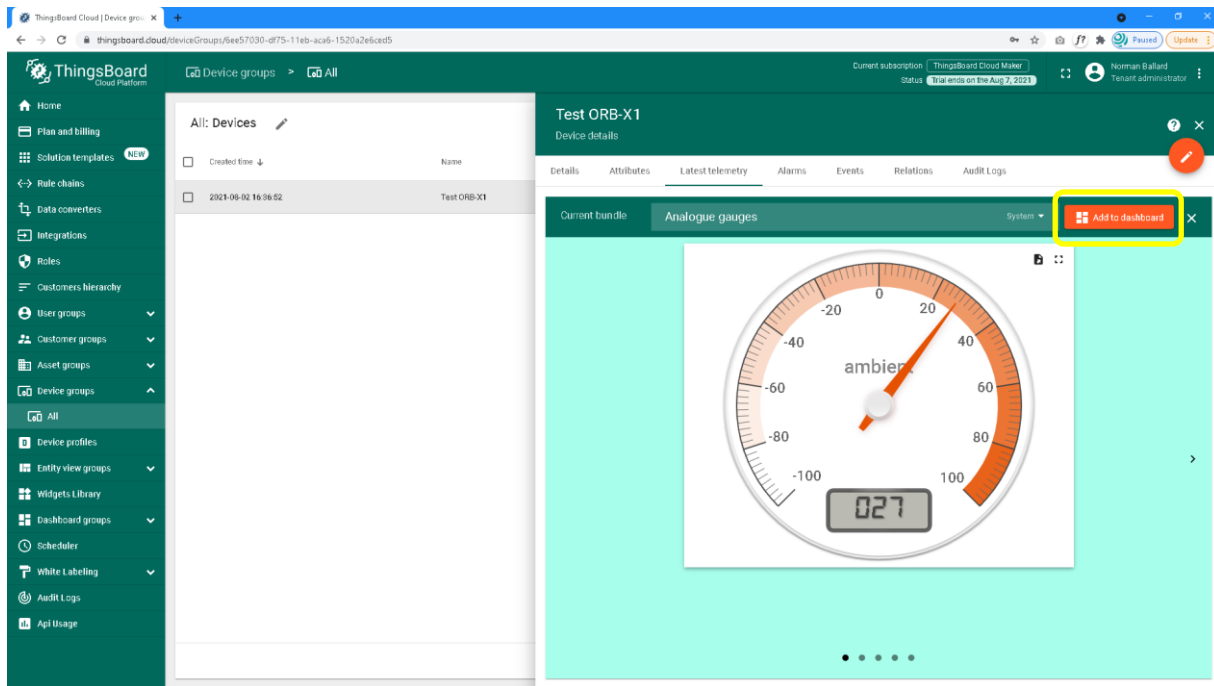


Figure 11 - Choosing a Widget

3. The widget is now visible on your dashboard. Further widgets can be added by following the same procedure.

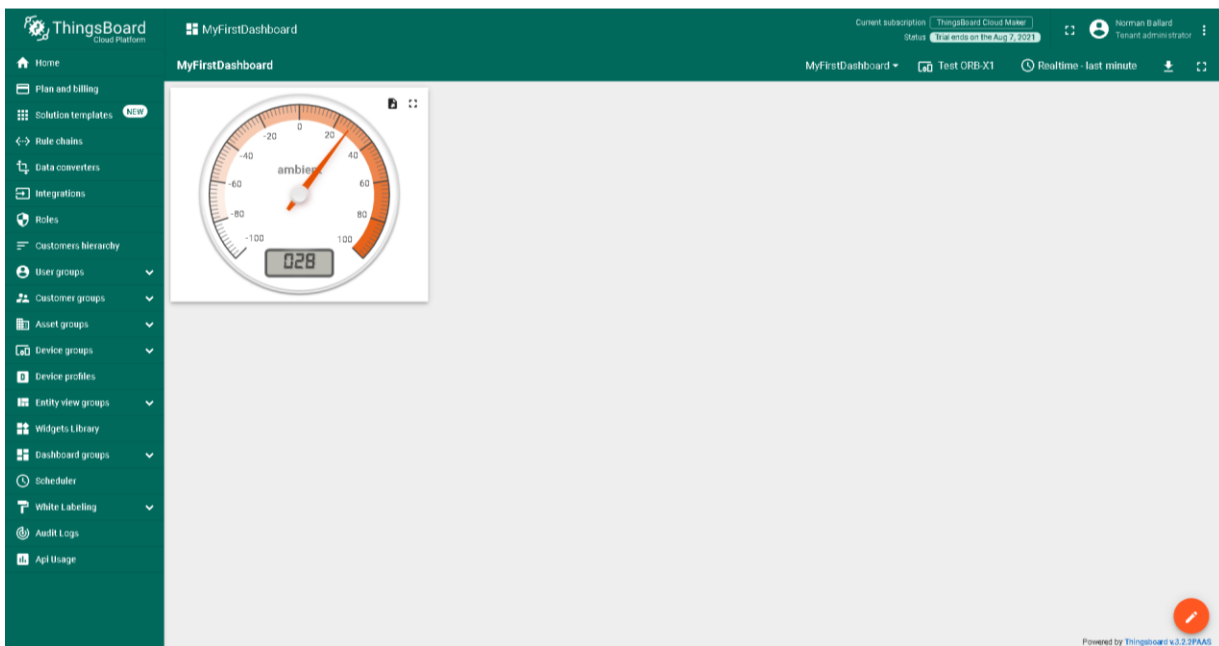


Figure 12 - Simple ThingsBoard Dashboard

4. Conclusion

Configuring a Senquip ORB to send data to ThingsBoard is simple using the ORB MQTT endpoint settings. The ThingsBoard offers a flexible dashboard that is configurable for most IoT applications.

Senquip devices can maintain connection with a third-party endpoint and the Senquip Portal at the same time. This allows for configuration changes and firmware updates from the Senquip Portal whilst sending data to a third-party server.

Senquip also offers hosting of your data, and data visualisation dashboards as shown in Figure 13. For further information on Senquip hosting and dashboards, please contact Senquip at support@senquip.com.

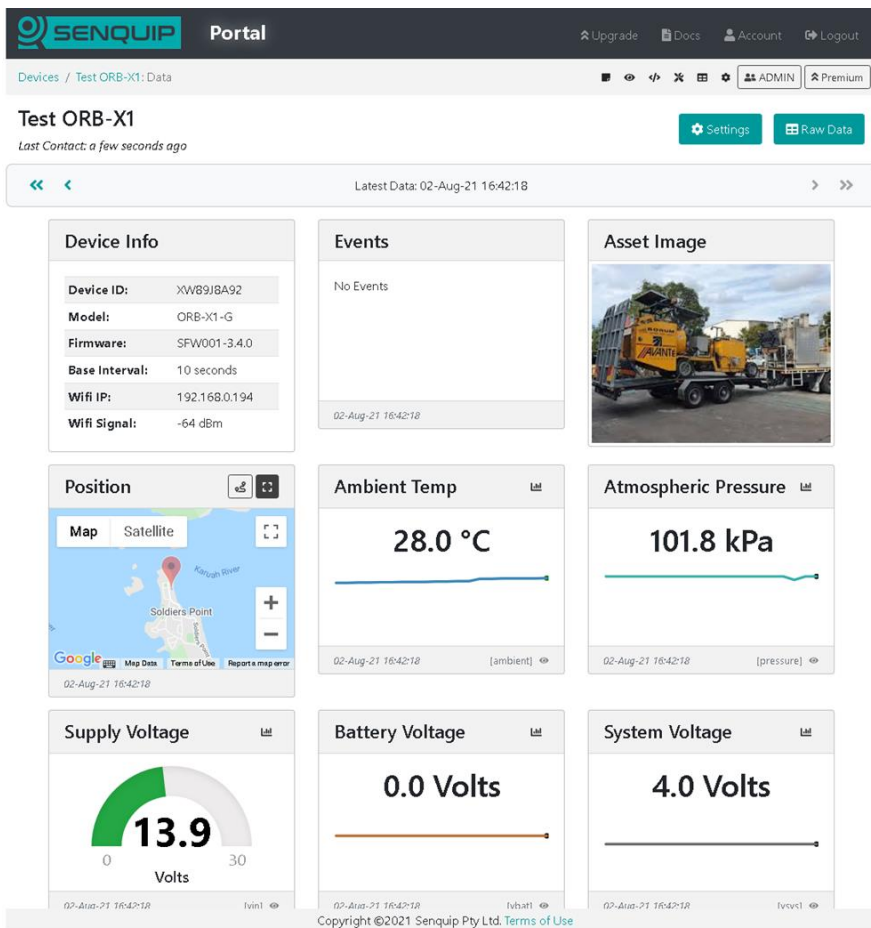


Figure 13 - Example Senquip Portal Dashboard