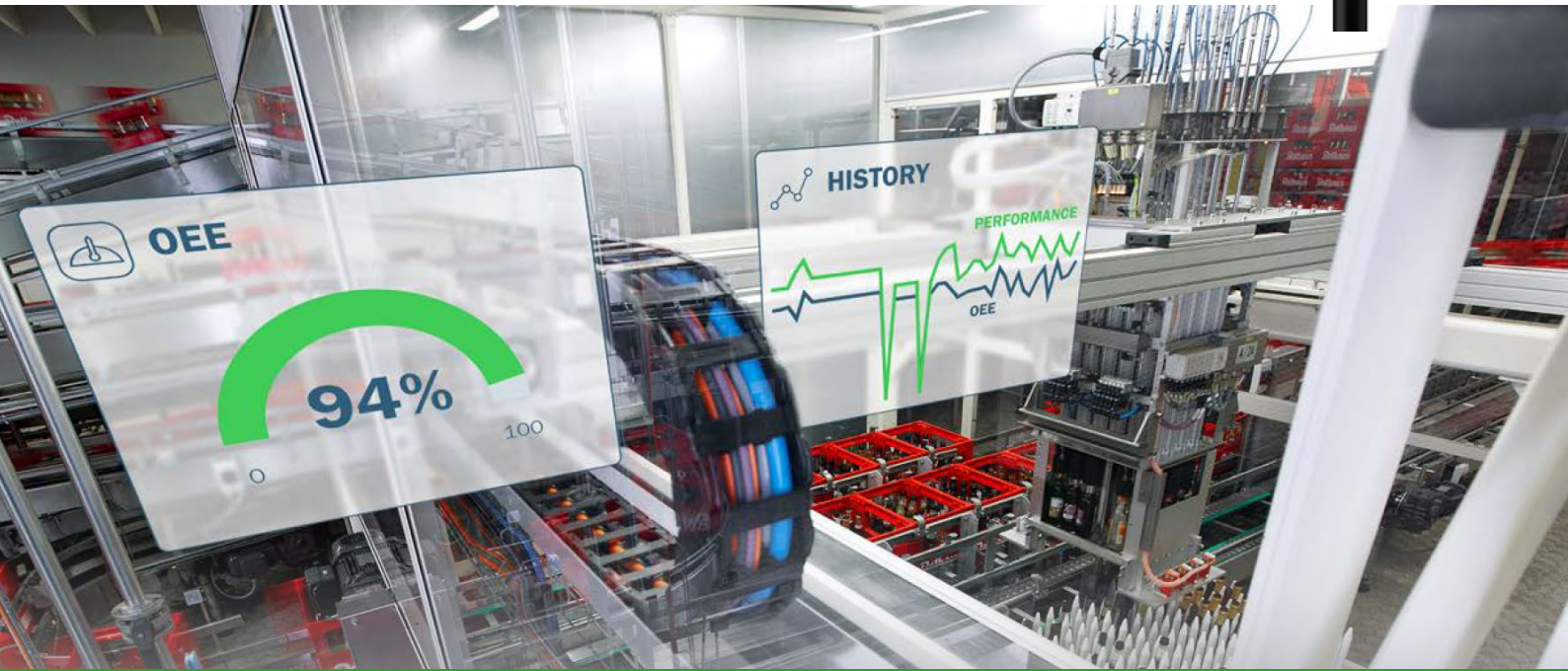


MANAGED MACHINE NETWORK INTEGRATION WITH XIOT CLOUD CONNECTED SENSOR

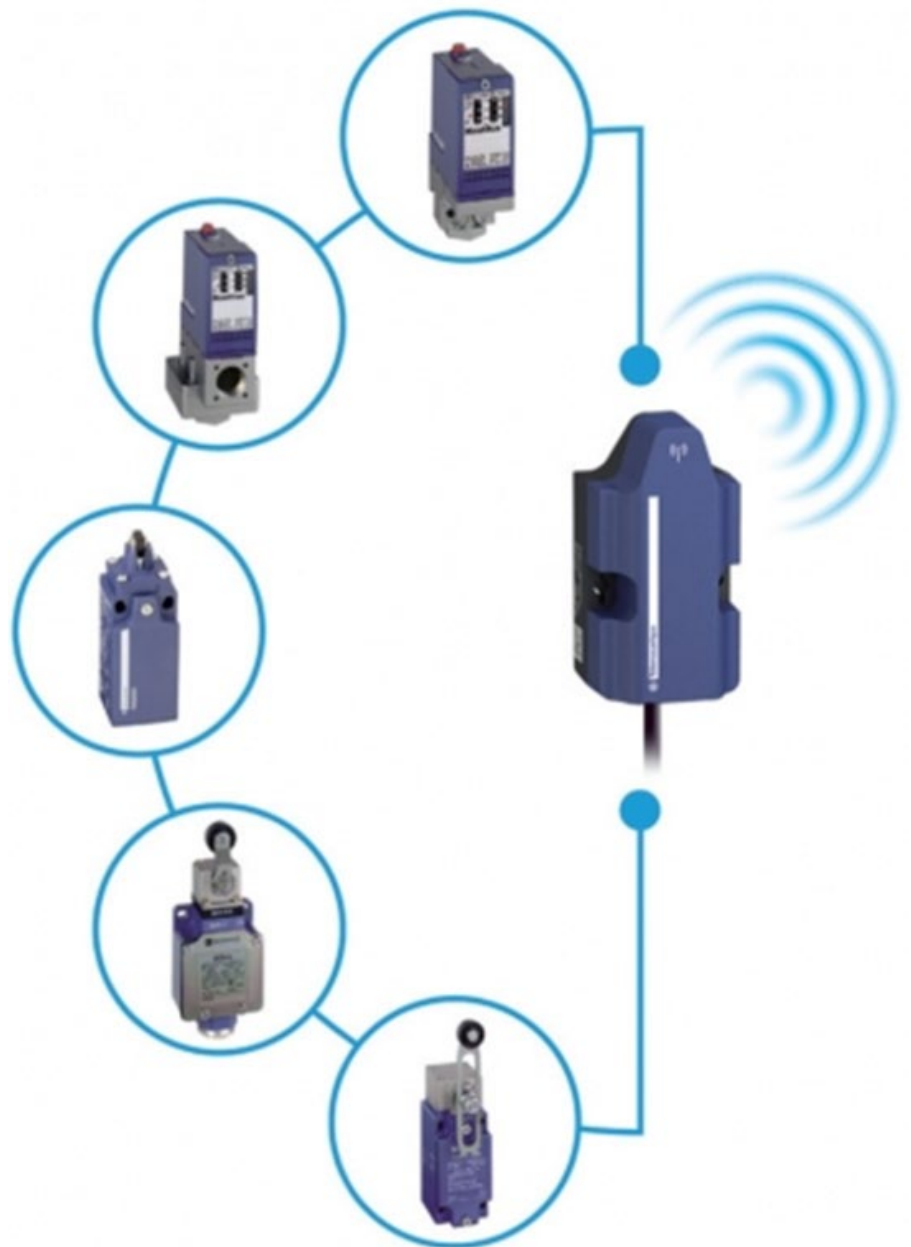


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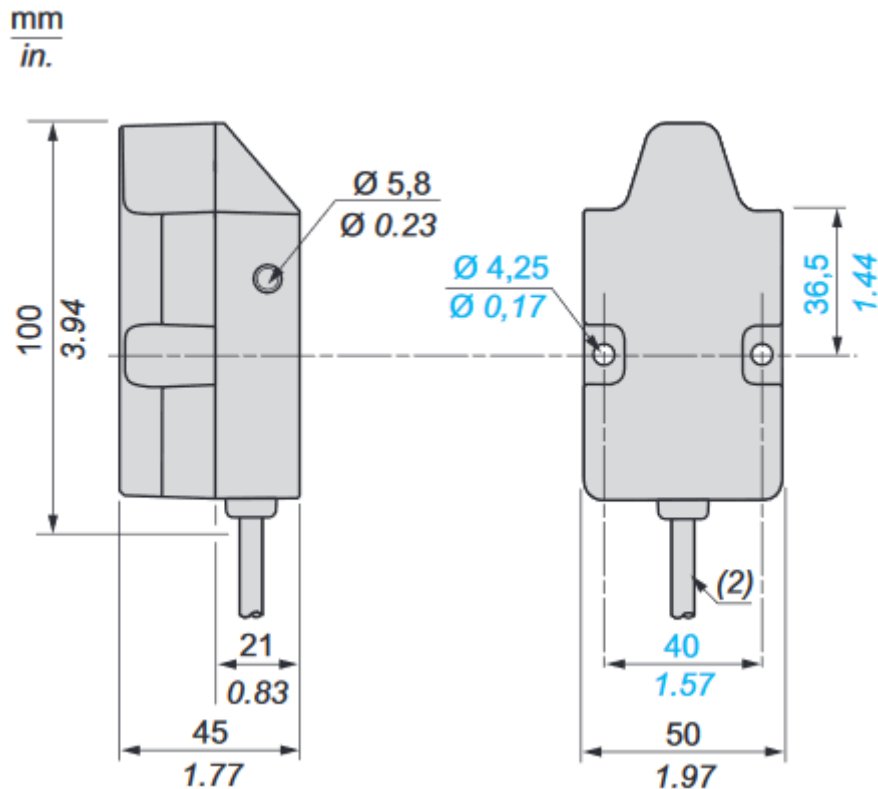
Preface

In this document we will be talking about the XIOT Cloud Connected sensor device. We will extract data from the XIOT SAAS platform and send it into a dashboard via Node-RED. XIOT is a product of Telemecanique. Telemecanique is part of Schneider Electric.



XIOT Concept

The "Simply easy!" solution to monitor your most unreachable assets.



- Powered by built-in lithium battery with a lifespan of over 5 years (up to 10 years for 2 frames/day).
- IP 66 protection provided by a sealed case with one cable outlet (PVC, 4-wire, for connecting 2 volt-free contacts).
- Transmitter can be enrolled from a smartphone app or via a webpage.

What is XIOT?

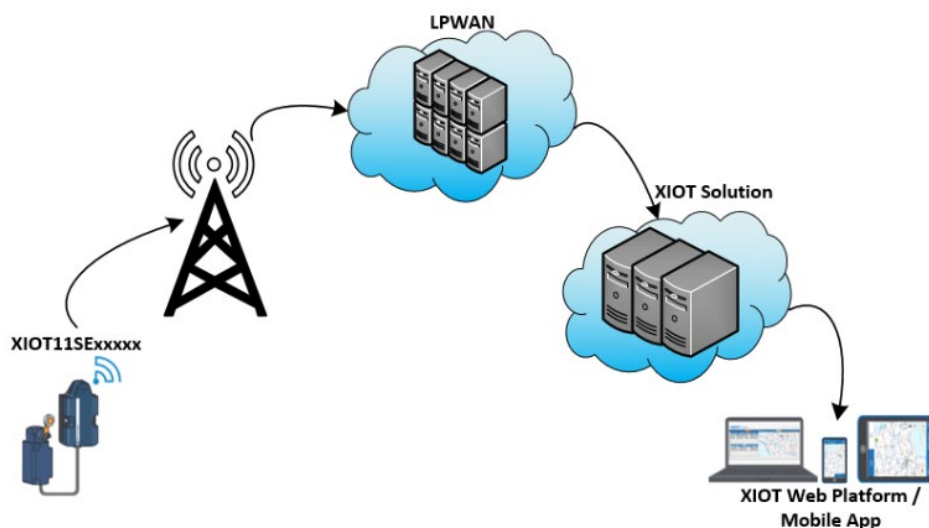
XIOT is a device which is made for areas without electricity or difficult-to-access.

The XIOT Cloud Connected sensor from Telemecanique is based on LPWAN (low power wide area network) technology, operated by Sigfox.

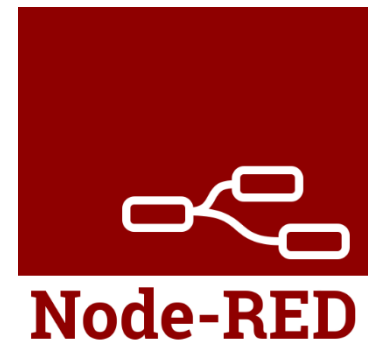
Because the XIOT sensor does not have any internet ports and WIFI it is not reachable via the internet. Because of this it is a very secure way to handle signals.

The Sigfox network covers 32 countries and is already very extensive in Europe. It is also being rapidly deployed in the US and Asia-Pacific. It uses antennas with a range of about 50 km.

The map on the Sigfox website shows exactly which areas are covered by the network. See: <https://sigfox.com/en/coverage>



Node-RED integration



What is Node-RED?

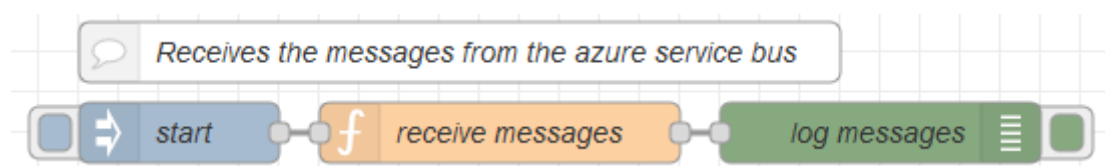
Node-RED is a programming tool for wiring together hardware devices, APIs and online services in new and interesting ways.

It provides a browser-based editor that makes it easy to wire together flows using the wide range of nodes in the palette that can be deployed to its runtime in a single-click.

XIOT Node-RED configuration

Before you are able to use the received data in dashboards it first has to be converted to a standard data format in for example Node-RED.

To receive the XIOT messages in Node-RED we made a connection flow example:



Connectivity

The XIOT Cloud Connected sensors are connected via a SAAS platform created by Telemecanique. In Node-RED we connect to this platform to extract the data. We then store this data in a database and forward it to two dashboards.

This is the code we use to make a connection with the Azure Service Bus Client. The XIOT SAAS platform stores events in Azure.

```
// The npm package.
const { ServiceBusClient, ReceiveMode } = global.get('azureServiceBus');

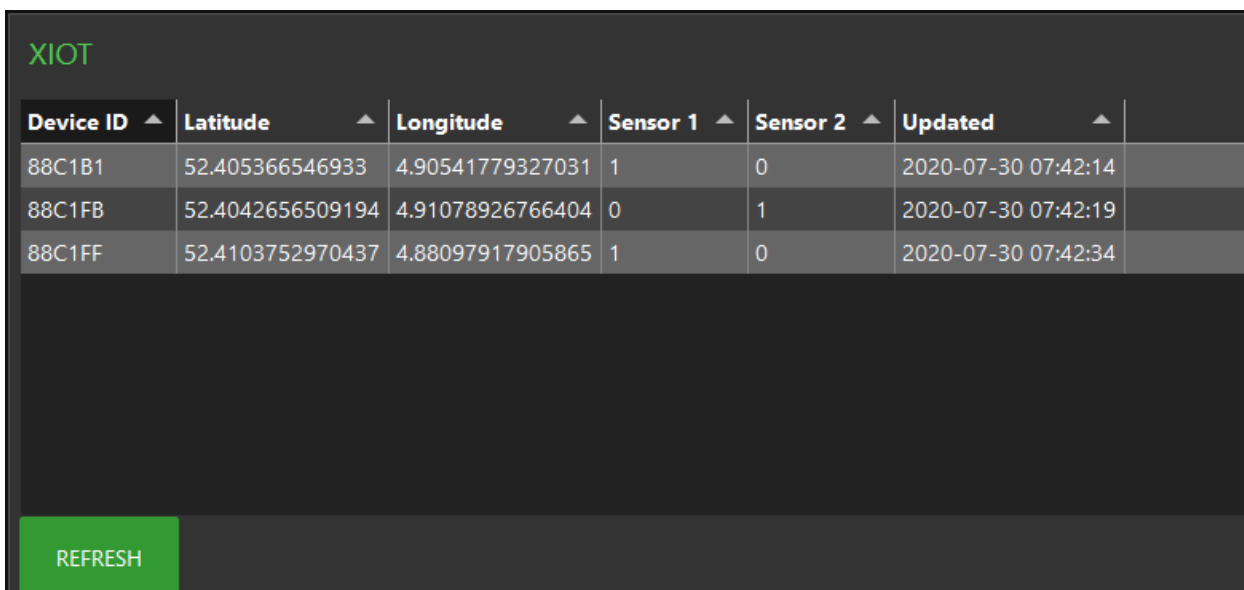
// Define connection string and related Service Bus entity names here.
const connectionString = "";
const queueName = "";

async function main(){
  // Makes a connection to the Azure Service Bus and opens the queue to receive messages.
  const sbClient = ServiceBusClient.createFromConnectionString(connectionString);
  const queueClient = sbClient.createQueueClient(queueName);
  const receiver = queueClient.createReceiver(ReceiveMode.receiveAndDelete);
  try {
    // Waits until 10 messages are received, or 1 minute has passed.
    const messages = await receiver.receiveMessages(10)
    // After each message, executes the updateXiotDevice function.
    messages.forEach(message => {
      updateXiotDevice(message.body);
    });
    // Closes queue when queue is empty.
    await queueClient.close();
  } finally {
    // Closes connection.
    await sbClient.close();
  }
}
```


We then process the data and store the data to our database.

id	lat	lng	s1_state	s2_state	last_updated
88C1B1	52.405366546933	4.90541779327031	1	0	2020-07-30 07:42:14
88C1FB	52.4042656509194	4.91078926766404	0	1	2020-07-30 07:42:19
88C1FF	52.4103752970437	4.88097917905865	1	0	2020-07-30 07:42:34

Below is a screenshot of the devices in Node-Red. We created a small table with the most important variables like the position and state. Each XIOT device can have two sensor statuses.



The screenshot shows a Node-RED interface with a table titled 'XIOT'. The table has columns for Device ID, Latitude, Longitude, Sensor 1, Sensor 2, and Updated. Below the table is a green 'REFRESH' button.

Device ID	Latitude	Longitude	Sensor 1	Sensor 2	Updated
88C1B1	52.405366546933	4.90541779327031	1	0	2020-07-30 07:42:14
88C1FB	52.4042656509194	4.91078926766404	0	1	2020-07-30 07:42:19
88C1FF	52.4103752970437	4.88097917905865	1	0	2020-07-30 07:42:34

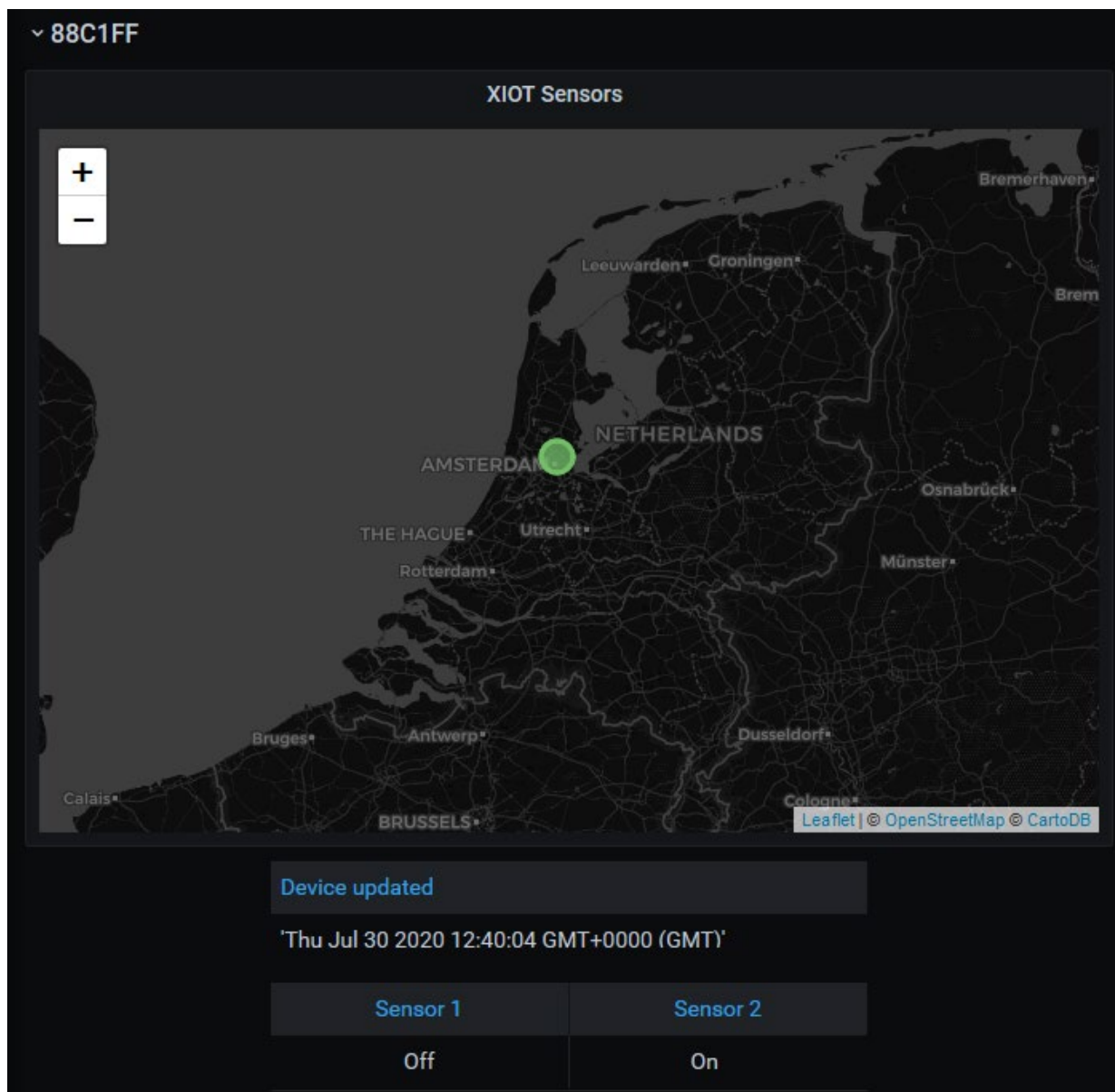
Now we have the status in Node-RED we can transmit it to any system. This can be any ERP, SAP or Cloud dashboard.

To demonstrate what you can do in Node-RED we send the XIOT device status to Grafana and Ecostruxure Machine Advisor at the same time.

Both are two different Cloud dashboards.

Grafana dashboard

In Grafana we created a small dashboard with a location and status of the XIOT device. We have put a dot on the GPS position. The GPS position has an accuracy of 5 km because the position is calculated by the Sigfox antenna strength and not by GPS satellites.



Ecostruxure Machine Advisor dashboard

In Machine Advisor we also created a dashboard with the XIOT status.

Label	Name ↑	Timestamp	Value [Formatted Value]	Unit	Format	Factor	Associated Strings	Warning	Oem Only
<input type="checkbox"/> Door 4	88C1B1:_s1	04/08/2020 11:05:421 [1]		Set Unit	#####	Set Factor	2 associated string(s)	Add Warning	<input type="checkbox"/>
<input type="checkbox"/> Set Label	88C1B1:_s2	04/08/2020 11:05:420 [0]		Set Unit	#####	Set Factor	2 associated string(s)	Add Warning	<input type="checkbox"/>
<input type="checkbox"/> Door 3	88C1FB:_s1	04/08/2020 11:05:451 [1]		Set Unit	#####	Set Factor	2 associated string(s)	Add Warning	<input type="checkbox"/>
<input type="checkbox"/> Set Label	88C1FB:_s2	04/08/2020 11:05:450 [0]		Set Unit	#####	Set Factor	2 associated string(s)	Add Warning	<input type="checkbox"/>
<input type="checkbox"/> Door 1	88C1FF:_s1	04/08/2020 11:06:171 [1]		Set Unit	#####	Set Factor	2 associated string(s)	Add Warning	<input type="checkbox"/>
<input type="checkbox"/> Set Label	88C1FF:_s2	04/08/2020 11:06:170 [0]		Set Unit	#####	Set Factor	2 associated string(s)	Add Warning	<input type="checkbox"/>
<input type="checkbox"/> Door 2	88C203:_s1	01/08/2020 07:48:080 [0]		Set Unit	#####	Set Factor	2 associated string(s)	Add Warning	<input type="checkbox"/>
<input type="checkbox"/> Set Label	88C203:_s2	01/08/2020 07:48:080 [0]		Set Unit	#####	Set Factor	2 associated string(s)	Add Warning	<input type="checkbox"/>

In Node-RED we send the data to Machine Advisor. Each row is a separate variable. In this example we can see 8 sensors of 4 XIOT devices.

In a dashboard we can show the status of each sensor and attach an alarm to it. We have defined a label to each sensor.

☰: XIOT status	
Door 1	Open
Door 2	Closed
Door 3	Closed
Door 4	Open

Conclusion

It can be quite challenging to get data from a secluded area and the XIOT device solves this problem with the Sigfox Network. With Node-RED we can connect to the XIOT SAAS platform and extract and transform data into any format/system.

To manage the received data from XIOT sensors in a scalable way, Managed Machine Network created a system which makes it much easier to handle any type of data and process it so you can use the data inside your own processes or SCADA environment.

Sources

Managed Machine Network	https://machinenetwork.io/
Schneider Electric	https://www.se.com/us/en/
Telemecanique Sensors	https://tesensors.com/
Node-RED	https://nodered.org/