



MCS LoRa-2-BMS LTE All-in-One Master Gateway User Guide

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Introduction

With the MCS LoRa-2-BMS Gateway you have an all-in-one Gateway to connect your building management system with wireless LoRa sensors via BACnet IP. The LoRa-2 BMS Gateway is in fact a combination of various techniques in one gateway

- LoRa Base station with internal LoRaWan server so that you can set up a Private LoRa network. So you do not need a public LoRa or external LoRaWan server and therefore you do not have these monthly costs.
- Payload conversion of the LoRa sensors is done by the gateway; no external payload conversion server is therefore needed. This also avoids costs.
- Bacnet IP protocol and other protocols (such as Modbus, MBus, P1) are integrated and used to communicate with your building management system.
- MQTT or other protocols communicate with your application server.
- Optionally, we can provide a Secure VPN so you can remote access the Gateway

Step 1: Connecting LoRa-2-BMS to the internet

This is the first step in setting up your LoRa-2-BMS. Please follow the instructions below carefully

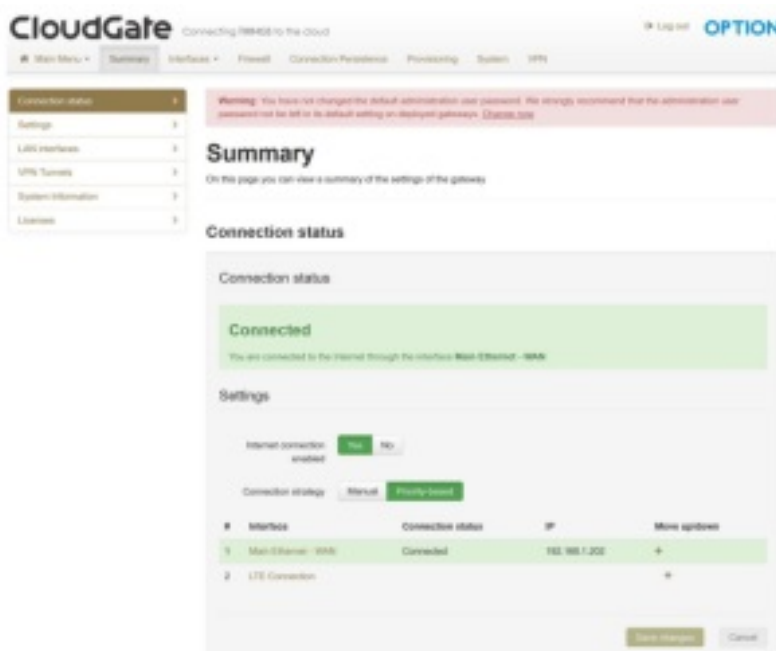
1. Connect the LoRa-2-BMS to your computer via ethernet cable. Make sure to use the LAN ethernet port to connect the LoRa-2-BMS to your computer.
2. Connect the LoRa-2-BMS to the internet using an ethernet cable. Make sure to use the WAN ethernet port on the LoRa-2-BMS.

In case you want to connect the LoRa-2-BMS to the internet using the Mobile network (i.e. 4G/LTE,...), you can skip this step

3. Power on the LoRa-2-BMS by plugging in the power supply
Please note! It takes about 3minutes to perform a cold boot!
4. Open your web browser and browse to 192.168.1.1.
5. Log in using “Admin123!” as default username and “admin” as default password.

It is highly recommended to change the username and password! This can be done in the “System” tab in the “Username & Password” section.

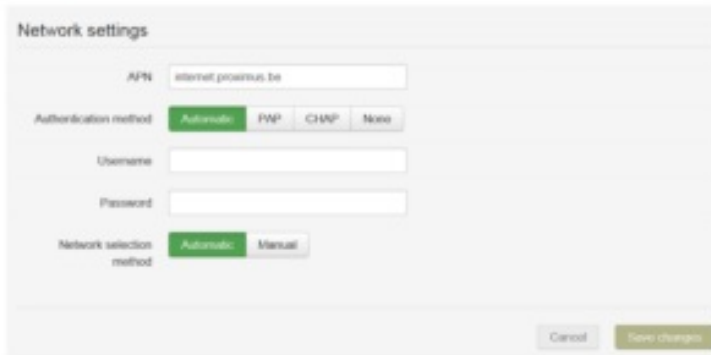
6. Next, click on the “Summary” page to check if the LoRa-2-BMS is connected to the internet. In the example below, the LoRa-2-BMS is connected via the WAN Ethernet connection.



7. In case you are connecting the LoRa-2-BMS to the internet using the Mobile Network, please proceed to the

“Interfaces” tab and click on “LTE Connection”.

8. Enter the APN of your Mobile Network Operator in the designated field, together with the preferred authentication method.



9. Make sure to press the “Save changes” button after completion.

10. Click on the “Summary” page to check if the LoRa-2-BMS is connected to the internet. In the example below, the LoRa-2-BMS is connected via the LTE connection.



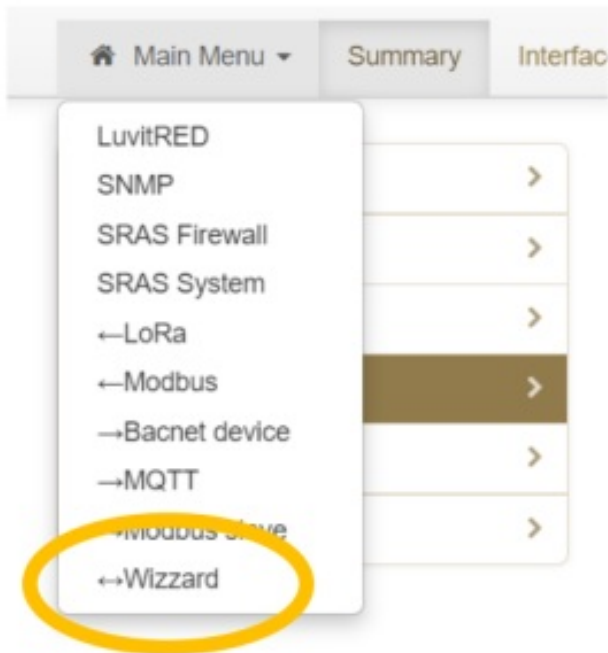
#	Interface	Connection status	IP	Move up/down
1	LTE Connection	Connected	37.62.4.82	

Please note! If your computer is connected to the LAN port of the LoRa-2-BMS, it will get internet access through this interface. In case the LoRa-2-BMS is connected over the Mobile Network (4G/LTE) any data your computer generates will go over this Mobile connection!

Step 2: Configuring the Sensor Input

This is the second step in setting up your LoRa-2-BMS.

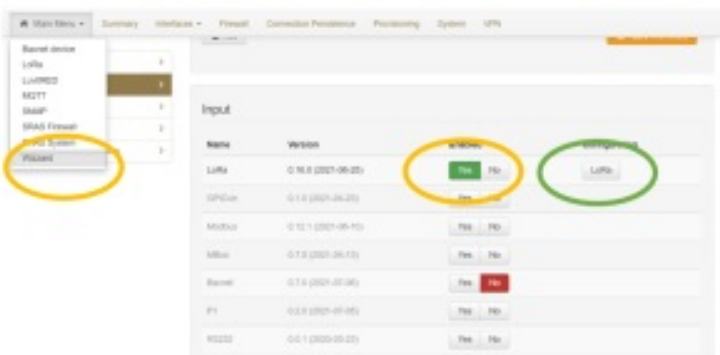
The Wizzard application is configured by MCS, and can be found under "Main menu".



The LoRa-2-BMS Wizzard can be used to connect sensors and devices of different interfaces and/or protocols. The list below gives an overview of the currently supported Input interfaces and/or protocols:

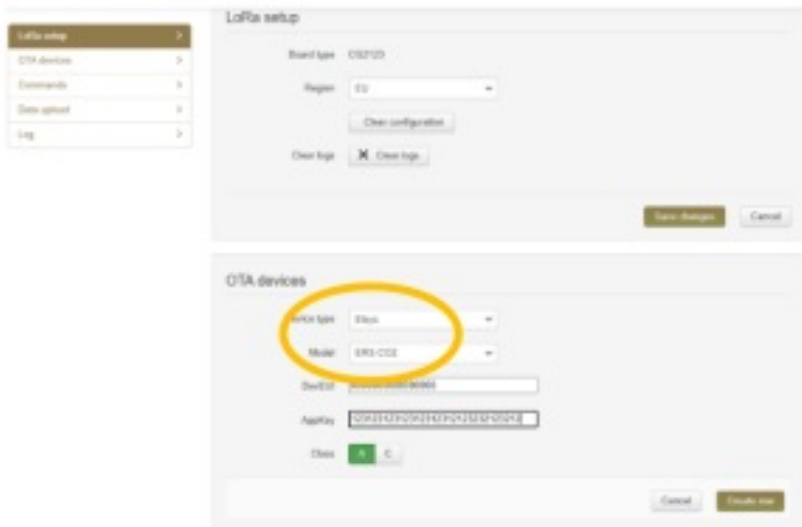
Input			
Name	Version	Enabled	
RS232	0.0.1 (2020-03-23)	Yes	No
Modbus	0.12.0 (2021-02-03)	Yes	No
LoRa	0.12.4 (2021-03-05)	Yes	No
Mbus	0.7.4 (2021-02-11)	Yes	No
GPIO	0.0.1 (2020-03-23)	Yes	No
Bacnet	0.6.2 (2021-03-03)	Yes	No

For the first step we define LoRa as Input in the Wizzard application:



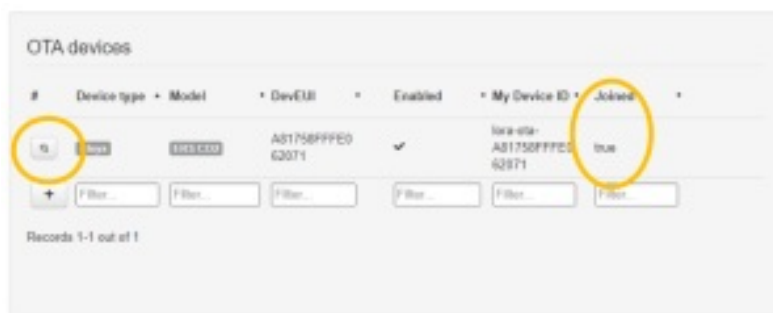
When we click enable “YES” a LoRa configuration button appears.

When adding LoRa Sensors, we can choose from an extensive library of embedded payload decoders.



The image shows two parts of a web interface. The top part is the 'LoRa setup' dialog, which includes fields for 'Board type' (set to 'CS212D'), 'Region' (set to 'EU'), and buttons for 'Clear configuration' and 'Clear logs'. The bottom part is the 'OTA devices' registration form, which includes fields for 'Device type' (set to 'E800'), 'Model' (set to 'ERS-C02'), 'DevEUI' (set to 'A81758FFFE062071'), 'AppKey' (set to '20201010101010101010101010101010'), and a 'Class' dropdown (set to 'A'). There are also 'Join' and 'Cancel' buttons.

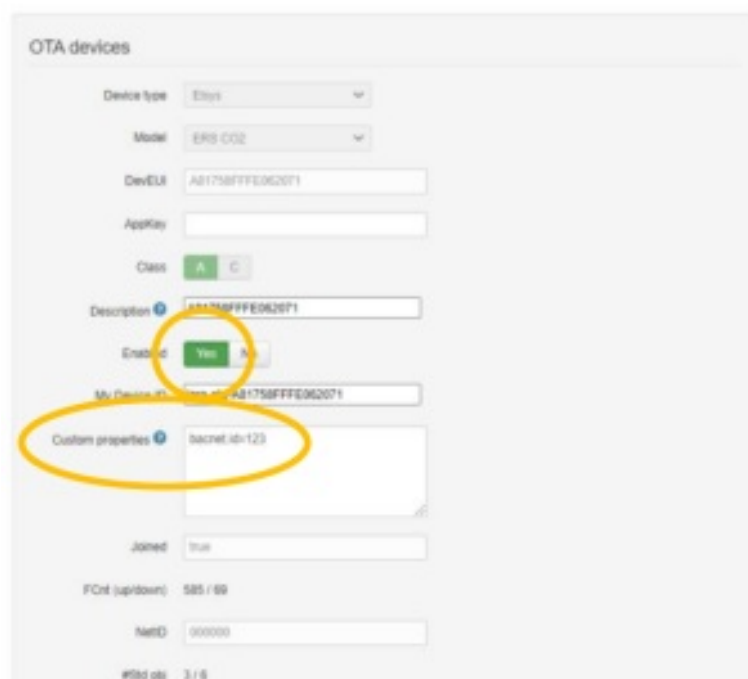
Now the device is registered in our OTA devices list.
After the join we can see the details of the device by clicking on the search icon.



The image shows a table of OTA devices. The table has columns: #, Device type, Model, DevEUI, Enabled, My Device ID, and Joined. A single device is listed with DevEUI 'A81758FFFE062071' and Joined status 'true'. A search icon is circled in the first column, and the 'Joined' status is circled in the last column.

#	Device type	Model	DevEUI	Enabled	My Device ID	Joined
1	E800	ERS-C02	A81758FFFE062071	✓	lorawan-A81758FFFE062071	true

It is important that enabled is set to YES, and that you fill in Custom properties, e.g. with bacnet.id=123



The image shows the details of a specific OTA device. The form includes fields for 'Device type' (E800), 'Model' (ERS-C02), 'DevEUI' (A81758FFFE062071), 'AppKey', 'Class' (A), 'Description' (A81758FFFE062071), 'Enabled' (Yes), 'My Device ID' (lorawan-A81758FFFE062071), 'Custom properties' (bacnet.id=123), 'Joined' (true), 'FCnt (up/down)' (585 / 88), 'NetID' (000000), and 'RSSI obj' (3 / 6). The 'Enabled' and 'Custom properties' fields are circled in yellow.

By scrolling down we come across the available objects that come from the payload of the LoRa device.

Objects (standard)	#	Object	Enabled	My Object ID	Value	Unit
	1	co2	✓	co2	454	ppm
	2	humidity	✓	humidity	57	%
	3	light	—	light	205	Lux
	4	motion	—	motion	2	
	5	temperature	✓	temperature	23.7	°C
	6	vdd	—	vdd	3582	mV

Filter... Filter... Filter... Filter... Filter...

Records 1-6 out of 6

By clicking on the object (search icon) we can enable the object as output object. After clicking YES you can save the settings.

Objects (standard)

Object: co2

Enabled: ☒ Yes ☐ No

My Object ID: co2

Value: 413

Unit: ppm

Time: 2021-07-15 15:58:26

Cancel Save

The last step is to enable the Data upload and press save.

OTA device: 3

Commands: 3

Data upload: 3

Log: 3

Data upload

Enabled: ☒ Yes ☐ No

Save changes Cancel

For each input interface/protocol, there is a guide that can be followed. Click on each of the links below to go to the corresponding tutorial

Input RS-232: <https://support.option.com/support/solutions/articles/36000275059>

Input Modbus: <https://support.option.com/support/solutions/articles/36000275073>

Input LoRa: <https://support.option.com/support/solutions/articles/36000274542>

Input Mbus: <https://support.option.com/support/solutions/articles/36000275065>

Input GPIO: <https://support.option.com/support/solutions/articles/36000275061>

Step 3: Configuring the Cloud Output

The LoRa-2-BMS Wizzard can be used to connect the CloudGate to the major Cloud Platform providers through a range of protocols. The list below gives an overview of the currently supported Output protocols

Output			
Name	Version	Enabled	
Bacnet device	0.3.0 (2021-08-24)	<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No
MQTT	0.9.0 (2021-04-13)	<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No
Azure IoT Hub	0.0.4 (2021-09-06)	<input type="checkbox"/> Yes	<input type="checkbox"/> No
AmazonAWS-MQTT	0.0.6 (2021-04-13)	<input type="checkbox"/> Yes	<input type="checkbox"/> No
Optimare	0.0.0 (2021-06-25)	<input type="checkbox"/> Yes	<input type="checkbox"/> No
Modbus slave	0.1.1 (2021-08-23)	<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No

For each cloud output protocol, there is a guide that can be followed. Click on each of the links below to go to the corresponding tutorial.

Output MQTT: <https://support.option.com/support/solutions/articles/36000274543>

Output Azure: <https://support.option.com/support/solutions/articles/36000274545>

Output AWS: <https://support.option.com/support/solutions/articles/36000286790>

Step 4: Configuring Output to the BMS

BACnet

For the first step we define BACnet as Output in the Wizzard application:

Output			
Name	Version	Enabled	
Azure IoT Hub	0.0.3 (2021-04-13)	<input type="checkbox"/> Yes	<input type="checkbox"/> No
AmazonAWS-MQTT	0.0.6 (2021-04-13)	<input type="checkbox"/> Yes	<input type="checkbox"/> No
MQTT	0.9.0 (2021-04-13)	<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No
Optimare	0.0.0 (2021-06-25)	<input type="checkbox"/> Yes	<input type="checkbox"/> No
Bacnet device	0.2.1 (2021-03-05)	<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No

When we click on enable “YES” a BACnet device configuration button appears. Clicking on this button takes you to the BACnet settings page.

Then on this page enable the settings and click save. Don’t forget to set, or discover the Device ID into your BMS environment.

Bacnet settings

Device ID

Name

Description

Location

Lan Net ID

Enabled ☒ Yes ☐ No

When we scroll down we get to the BACnet objects. Here we see the predefined LoRa objects converted to BACnet objects. The objects are now ready to be called by the BMS

The screenshot shows the CloudGate interface. On the left, there's a sidebar with 'BACnet objects' selected. The main area displays a list of BACnet objects with columns for Name, Version, and Enabled. Below the list, there's a 'Log' section. On the right, there's a large graph area showing data over time, with a legend on the far right.

Modbus slave

For the first step we define Modbus as Output in the Wizzard application:

Output			
Name	Version	Enabled	Configuration
Bacnet device	0.3.0 (2021-08-24)	<input checked="" type="radio"/> Yes <input type="radio"/> No	<input type="button" value="--Bacnet device"/>
MQTT	0.9.0 (2021-04-13)	<input checked="" type="radio"/> Yes <input type="radio"/> No	<input type="button" value="--MQTT"/>
Azure IoT Hub	0.0.4 (2021-09-06)	<input type="radio"/> Yes <input type="radio"/> No	
AmazonAWS-MQTT	0.0.6 (2021-04-13)	<input type="radio"/> Yes <input type="radio"/> No	
Optimum	0.9.0 (2021-06-25)	<input type="radio"/> Yes <input type="radio"/> No	
Modbus slave	0.1.1 (2021-08-23)	<input checked="" type="radio"/> Yes <input type="radio"/> No	<input type="button" value="--Modbus slave"/>

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Second step is to set the port on 502 for modbus slave communication.

Settings

Default configuration ☒ Default configuration

Modbus settings

Port

Save changes Cancel

After doing this last step, we can now see the registers appearing in our objects.

#	Source	Device	Object	Reg type	Address	Length (Registers)	Value
1	loa	10a-05a-AB175BFFED 453A2	TEMP_EL5YS	holding	0	2	23.2
2	loa	10a-05a-AB175BFFED 453A2	humidity	holding	2	1	45

Filter Filter Filter Filter Filter Filter Filter

Records 1-2 out of 2

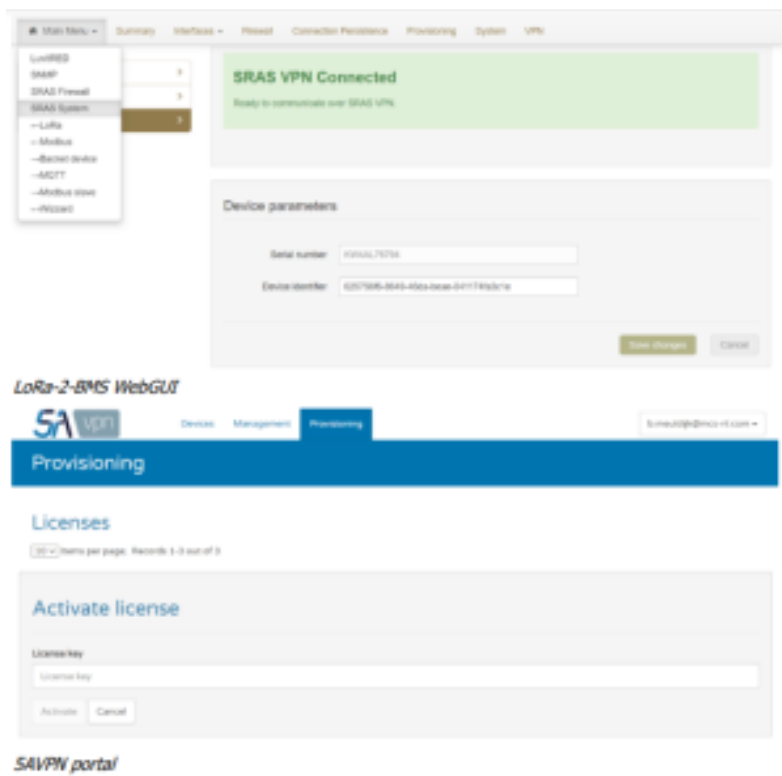
The registers are “03 registers” (read holding registers) 16 bits.

Secure Remote Access Service (SRAS)

Step 1: Configure your CloudGate Gateway (Optional services)

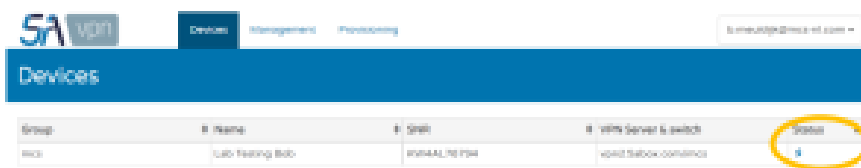
1. Register your CloudGate Gateway to the 5AVPN server via your MCS Point of Contact or you can send an E-mail to verkoop@mcs-nl.com. You get an invitation to create an account on the 5AVPN portal.
2. Ensure your CloudGate Gateway has a recent firmware version installed. (available for download on CloudGate Universe (www.cloudgateuniverse.com/))
3. Ensure your CloudGate Gateway has ‘SRAS – Secure Remote Access Service’ application installed. The SRAS comes mandatory (www.cloudgateuniverse.com/)
4. Enter the personal device identifier (obtained via verkoop@mcs-nl.com) on the CloudGate Gateway webGUI

Go to the WebGUI -> plugin -> SRAS system and enter the device identifier.



Step 2: Installing your client side.

After we have entered the license key in the LoRa-2-BMS gateway, and also in the provisioning tab of the 5AVPN platform, we see that the LoRa-2-BMS gateway is online.



The LoRa-2-BMS gateway is now registered into a virtual switch.

To make a connection to this virtual switch, you can click on the "click here for instructions" button on the device page. Here you must download the user client file and follow the instruction.

Lab Testing Bob (KW4AL76794)

VPN: KW4AL76794

Status: Reachable since 10/11/19 20

Name: Lab Testing Bob

Description: (F50)

VPN: Enabled Connect

IP: 192.168.84.255

URL: <http://KW4AL76794.mcs.mcs.nl>

You need to install a client to connect to the virtual ipsec2 Subnet.com, virtual switch mcs for the IPsec-VPN, to work.
[Click here for instructions](#)

To connect to the virtual switch:

For windows 7, 8, 8.1 and 10:

- Download the following file and save it: [mcs.vpn](#)
- Double-click on the file
- Click on "properties"
- In the security tab click on advanced settings and enter the shared secret "ipsec" and click the "OK" button
- Now click the "connect" button
- Now log into a combination of the username and the virtual switch: [b.meuldijs@mcs-nl.com@bms](#)
- Follow your password and click the "connect" button

For MAC OS:

- Download the following instructions

For IOS:

- Download the following instructions

For Android:

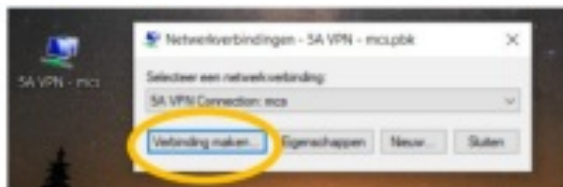
- Download the following instructions

Port forwarding ⓘ

No port forwarding rules are configured. You can configure them via the CloudGate's web interface (see left, above)

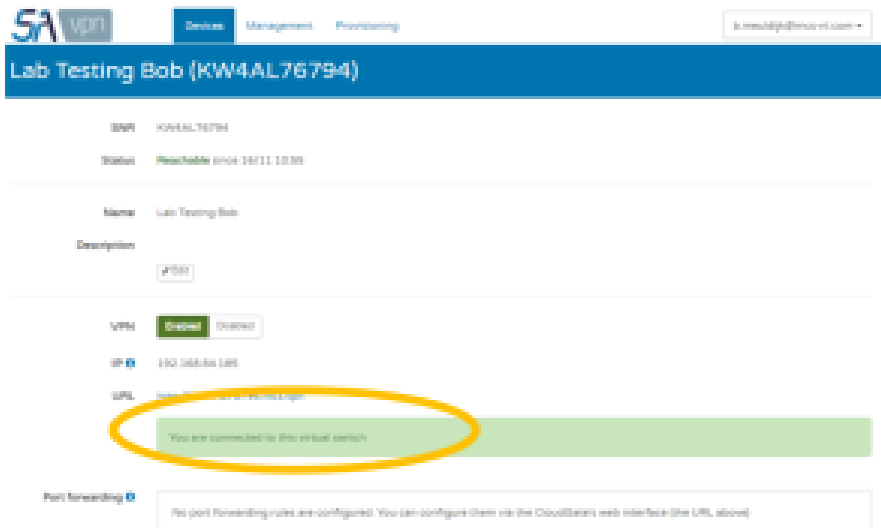
Step 3: Connecting to the LoRa-2-BMS gateway

After installing the client on your computer we can now make the connection to the virtual switch. By starting the client and login in with your credentials we have built the connection to the virtual switch.

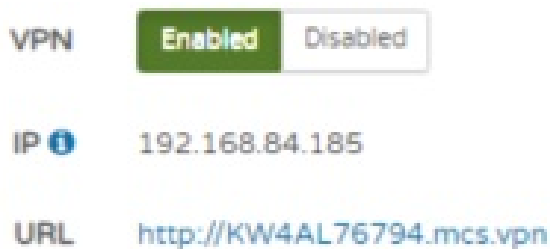




When we go back to the 5AVPN portal we can now see that we are connected to the virtual switch.



By clicking on the URL, or going to the IP address we come into the login screen of the LoRa-2-BMS gateway and have made our connection.



Please login


Username

Password

Login

Do you need further assistance? Please contact helpdesk@mcs-nl.com or go to:

Documents / Resources

	<p>MCS LoRa-2-BMS LTE All-in-One Master Gateway [pdf] User Guide LoRa-2-BMS LTE All-in-One Master Gateway, LoRa-2-BMS, LTE All-in-One Master Gateway</p>
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