SenseCap S2120 LoRaWAN Weather Station integration with the WaziGate

The SenseCap S2120 Weather Station by Seeed Studio is an exceptional addition to your Internet of Things (IoT) solution. This weather station is engineered to provide comprehensive weather data with a focus on meteorological measurements. Equipped with a range of environmental sensors, the S2120 delivers real-time weather information and ensures data accuracy through advanced technology.

The SenseCap S2120 incorporates state-of-the-art sensors for temperature, humidity, air pressure, wind speed, wind direction, rainfall, and more. These sensors work together seamlessly to capture precise meteorological data, which is then transmitted wirelessly to your designated IoT server using LoRaWAN technology. LoRaWAN ensures long-range data communication with minimal power consumption, making it a robust choice for remote and wide-area deployments.

Powered by a long-lasting battery, the S2120 weather station can operate continuously for an extended period, minimizing maintenance and enabling uninterrupted data collection. Its exceptional design and quality construction make it a reliable choice for various environmental monitoring applications.

The SenseCap S2120 Weather Station is the ideal solution for applications such as weather monitoring, environmental research, precision agriculture, and smart city projects. With its accurate and timely weather data, this weather station empowers your IoT infrastructure, enabling data-driven decisions for a wide range of industries and applications. Experience the future of weather monitoring with the SenseCap S2120 Weather Station by Seeed Studio.

1) Connecting to WaziGate - ABP mode

Step 1 : Setup a WaziGate & Seeedstudio SenseCap S2120

Recommended Hardware:

- **WaziGate**
- **WaziHAT** (single channel LoRa module)
- **Antennas for the selected frequency**
- **Micro SD-Card**

Setup WaziGate:

Here is a **tutorial** on how to **setup a Wazigate:**
https://lab.waziup.io/resources/waziup/wazigate#prepare-the-gateway-hardware

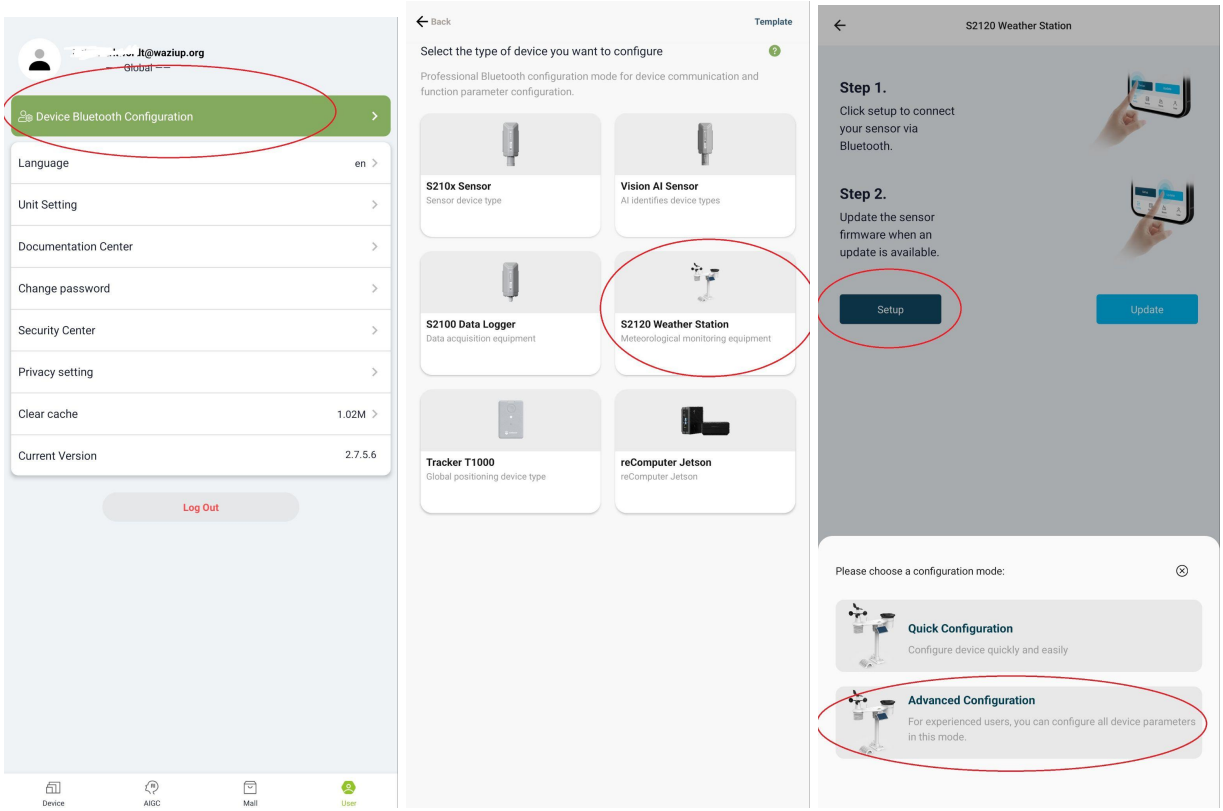
Setup SenseCap S2120:

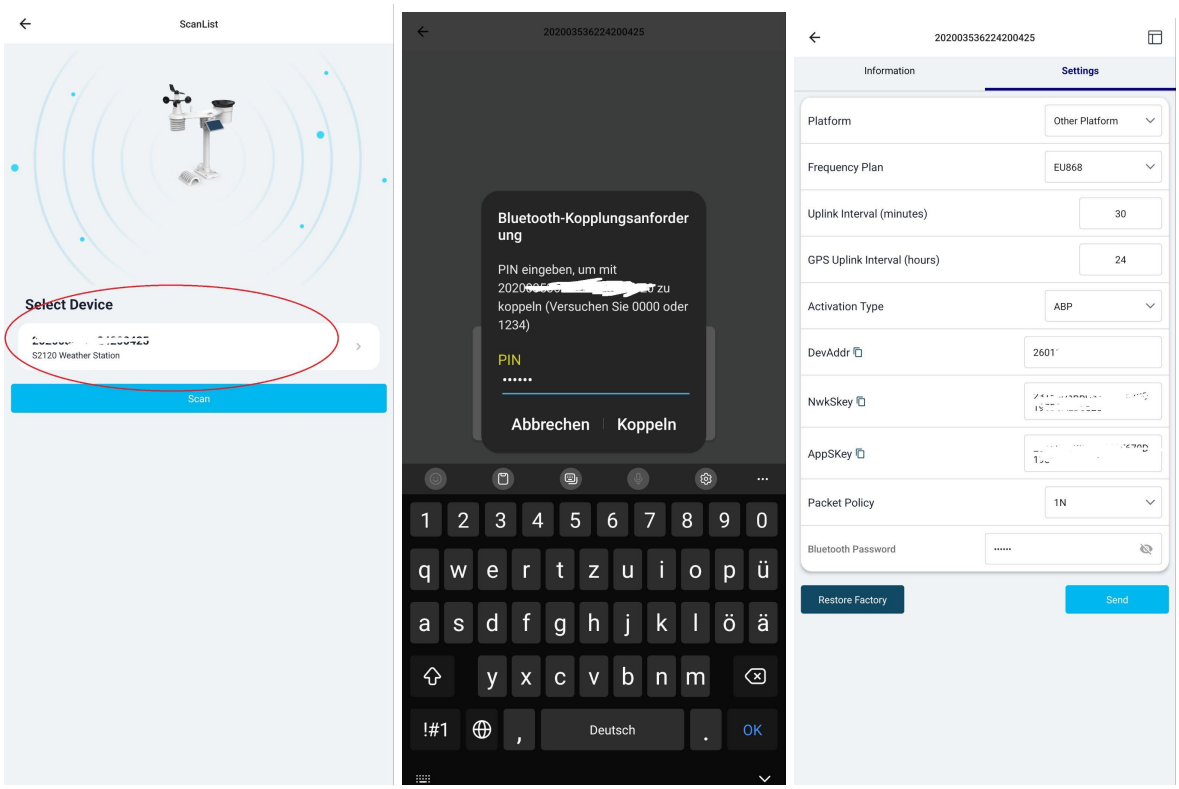
In the following there are the steps explained to **change the connection settings of the SenseCap weather station**. It is done by using an Android or iOS app. The name of the App is SenseCap, you will find it in PlayStore or AppStore.

After installing you can make a connection to the sensor, it is done via bluetooth, so you need to be close to the weather station.

Additional information about the weather station can be found in the official guide.

The screenshots below show the procedure:



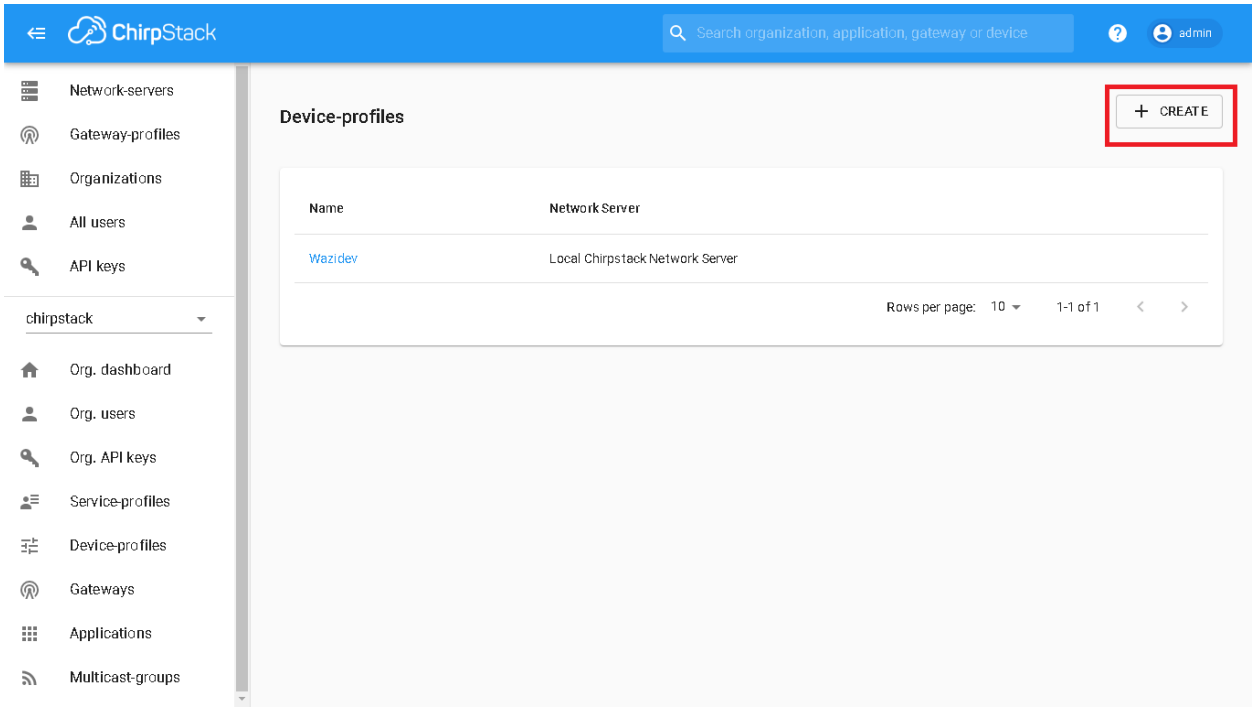


The default pin is: 000000

Step 2 : Create a new device profile on ChirpStack

Using a Web browser, open ChirpStack UI at wazigate.local:8080. The default username and password is admin admin.

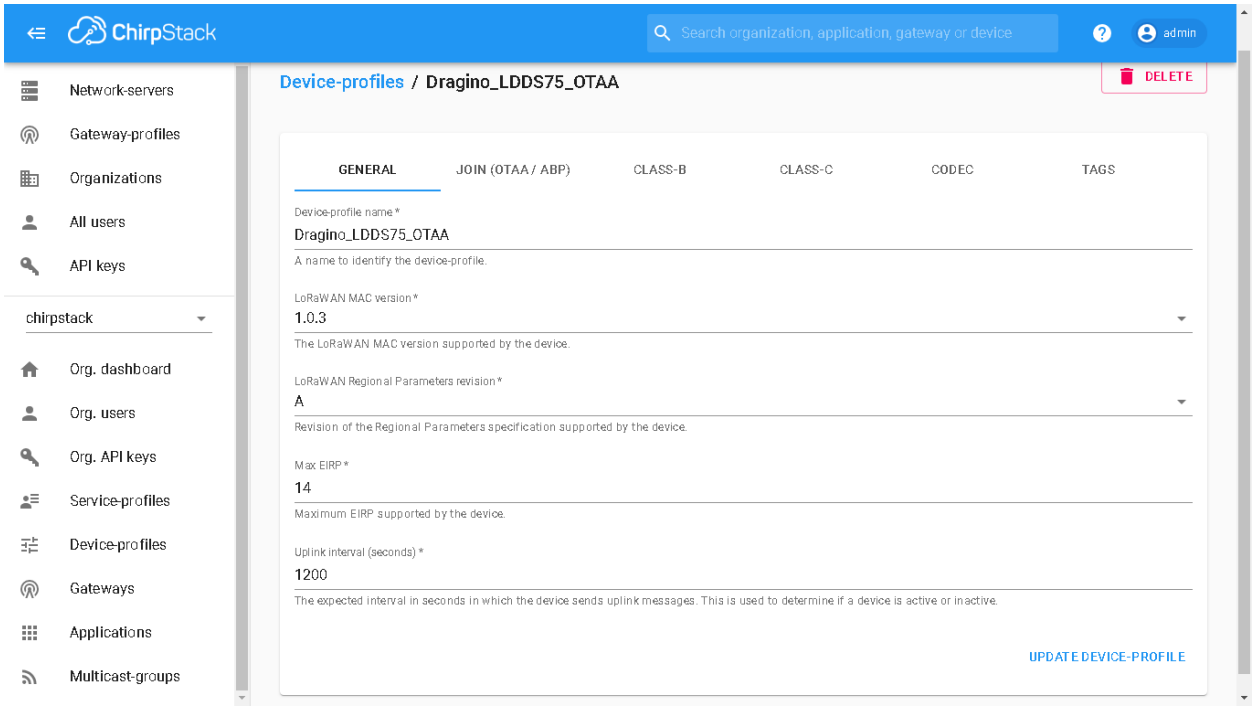
Next, go to the “Device-profiles” and click on WaziDev.



Now we need to enter the following details for the new device profile. Feel free to use a different “Device-profile name”

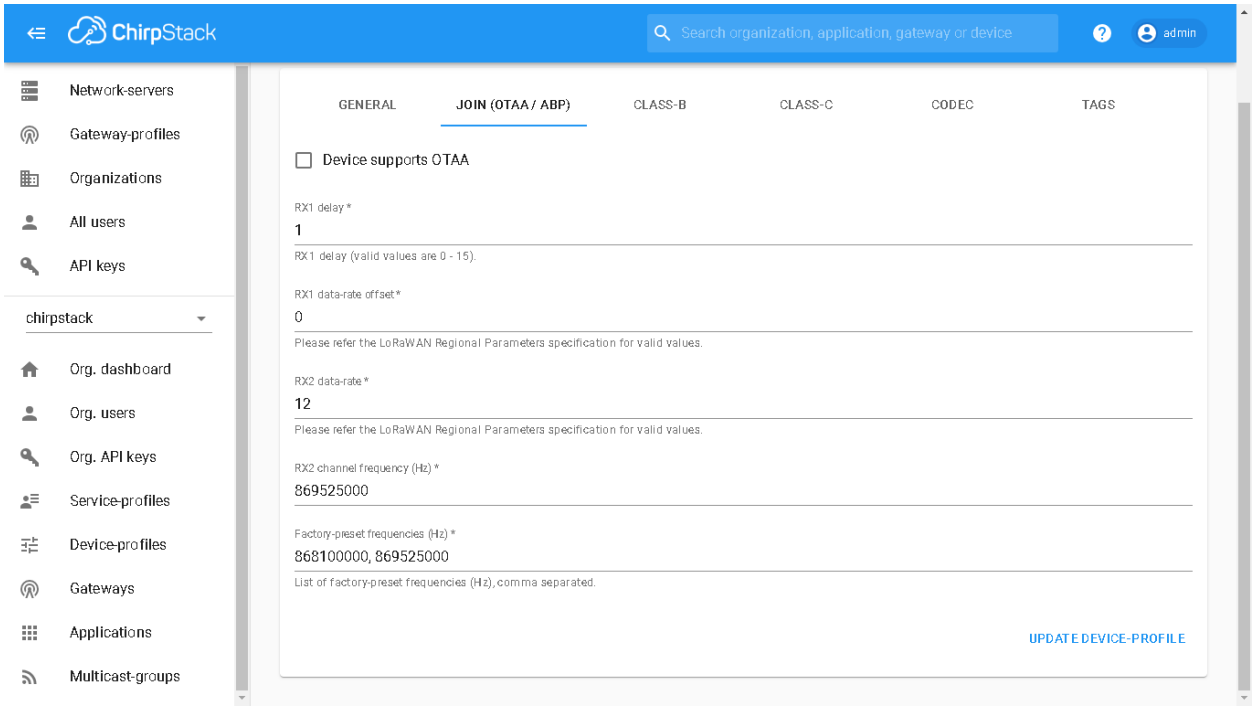
(a) For “GENERAL” enter the following information:

- Network-server * = Local ChirpStack Network Server
- LoRaWAN MAC version * = 1.0.3
- LoRaWAN Regional Parameters revision * = A
- Max EIRP * = 14
- Uplink interval (seconds) * = 0 (this value is just to measure quality of service in chirpstack, you can put in your transmission interval in seconds)



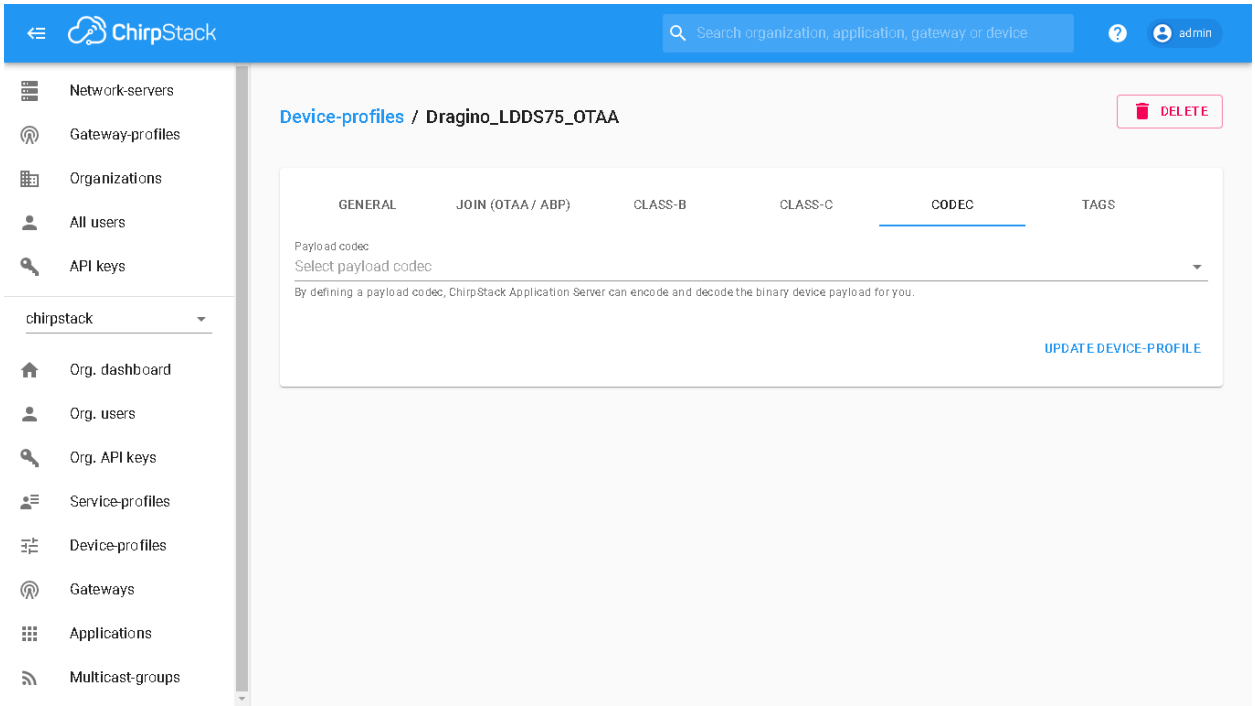
(b) For “JOIN (OTAA/ABP)” enter the following information:

- RX1 delay * = 1
- RX1 data-rate offset * = 0
- RX2 data-rate * = 0
- RX2 channel frequency (Hz) * = 868100000
- Factory-preset frequencies (Hz) * = 868100000

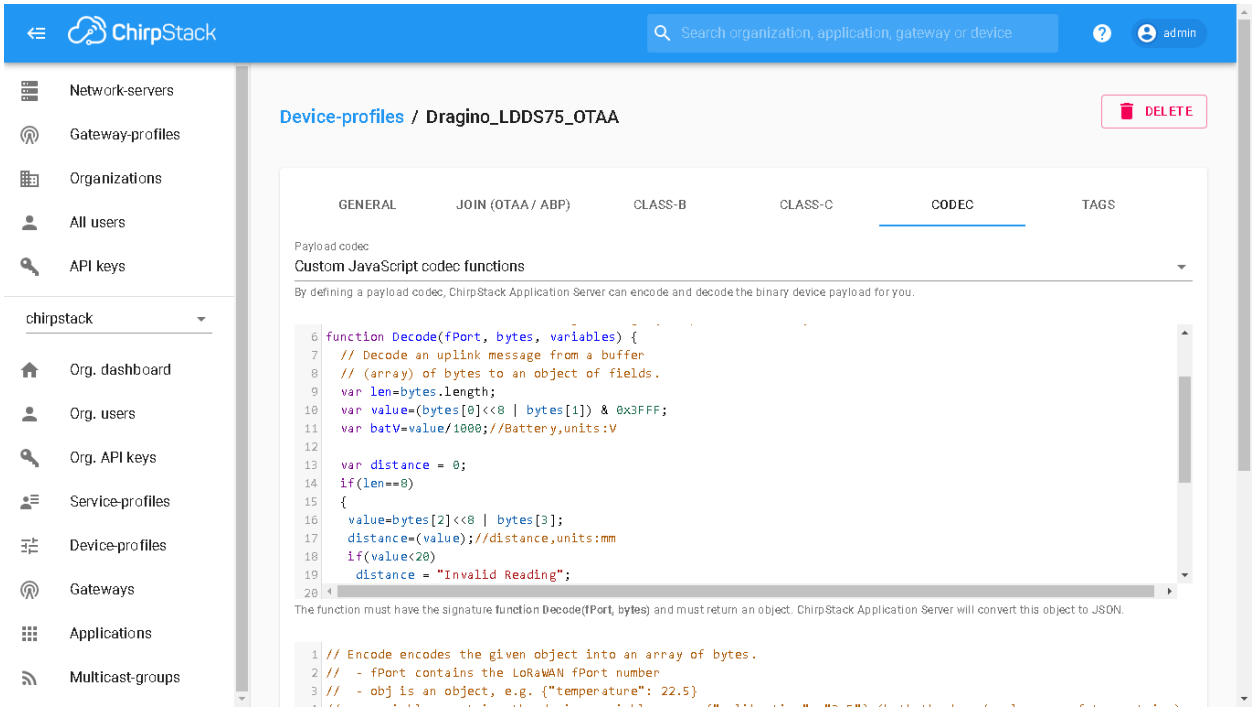


(c) Leave the “CLASS-B” and “CLASS-C” fields unchecked

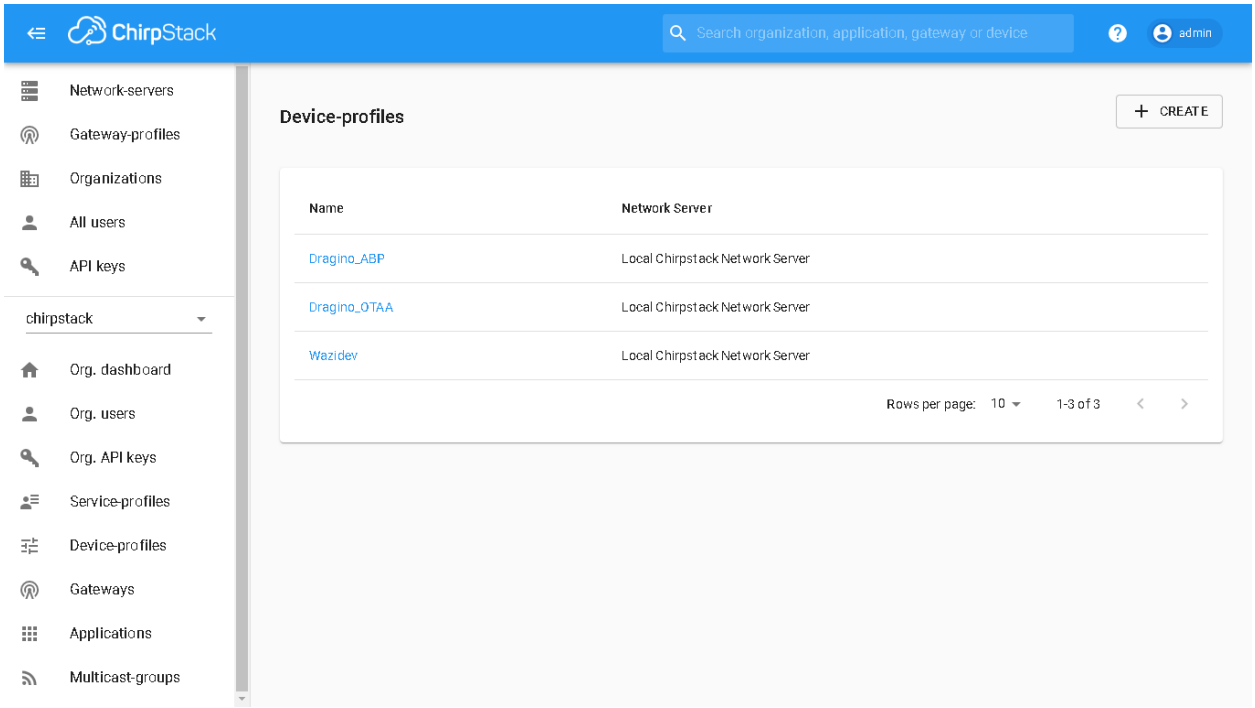
(d)**OPTIONAL** For “CODEC” select “None”. This is because the latest Wazigate version only requires the LoRaWAN bytes for the Decoder function. This decoder function will be executed by WaziGate Edge and it will create the sensor values.



However, if you intend to view the device data on ChirpStack you can select the “Custom JavaScript codec functions” and copy and paste this code into the custom codec section inside the codec tab of the device profile.



(e) Finally, click the “CREATE DEVICE-PROFILE” button. The new device profile will be listed under “Device-profiles”.

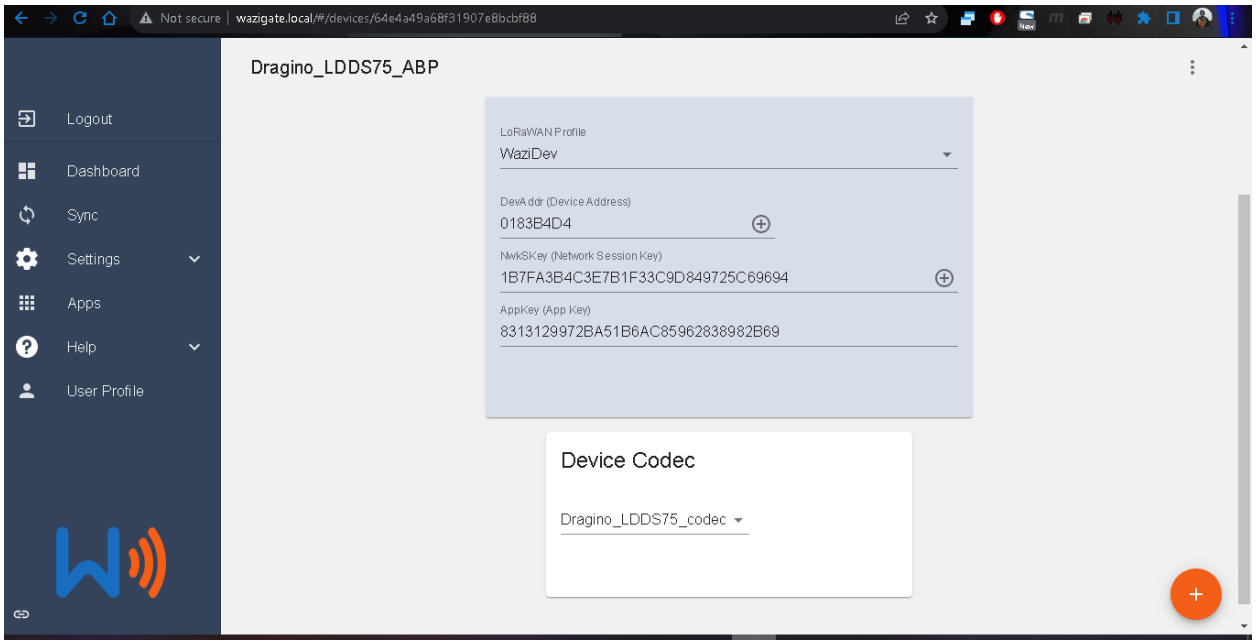


Step 3 : Create a ABP device on WaziGates dashboard

Use the Device Address, Network Session Key and App Key to set up the SenseCap S2120 on WaziGate Dashboard. These keys can be obtained from the packaging box that the LDDS75 was shipped in.

After creating the new device, note the device ID since it will be used in the next step.
This key can be obtained from the sticker that is on the bottom of the arm that leads to the wind speed sensor. The credentials for connection can also be changed via the SenseCap Mate application, described in Step 1.

The device codec can be chosen from the dropdown menu in the device overview. The codec has already been added to the WaziGate for you, you should replace the codec id in the JavaScript code to the one you will find under http://wazigate.local/codecs, if you get a message “Unauthorized”, you just have to log in to the UI again (http://wazigate.local).



If you do not have a custom codec on WaziGate, you can still run the JavaScript code. Afterwards add a custom codec on WaziGate and assign this to the respective device.

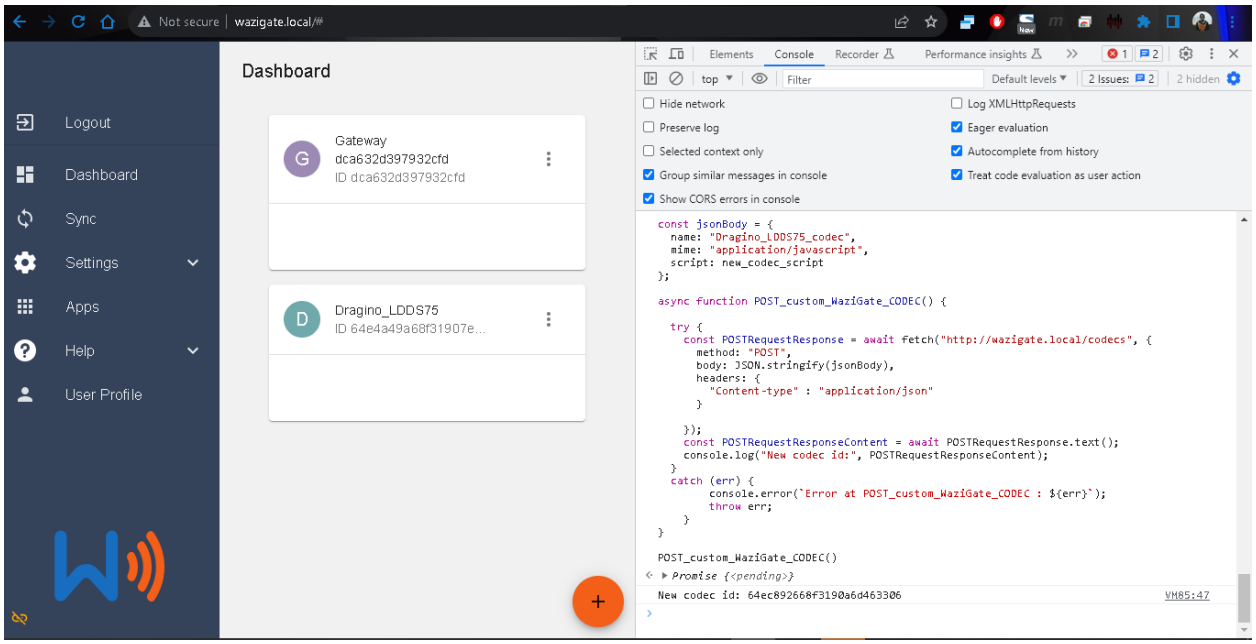
Step 4 : Select the custom WaziGate codec for the SenseCap

Since the SenseCap S2120 Codec is included in the WaziGate you just have to select it after creating the device.

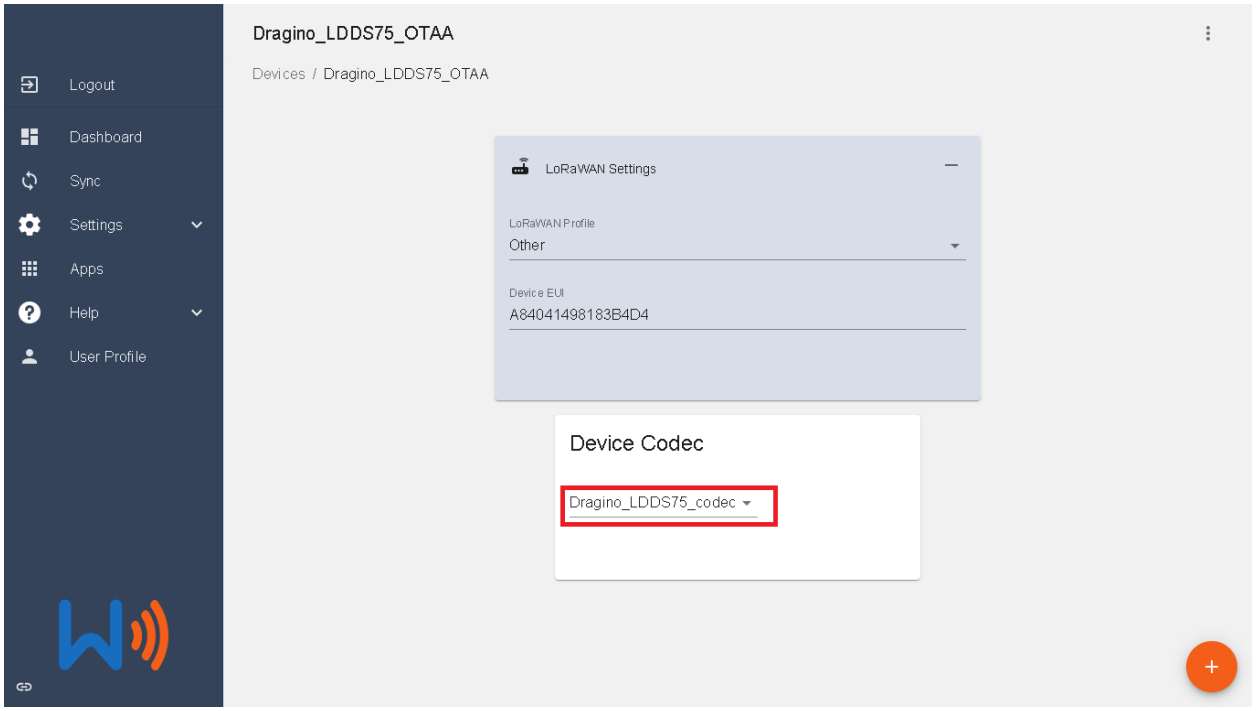
Upload codecs via the WaziGates API (optional, not needed for Seeedstudio SenseCap S2120):

Before we can save and view the sensor data on WaziGate, we need to add a custom decoder function for the bytes that WaziGate is receiving from ChirpStack. The WaziGate Edge GitHub repository has a codec documentation that shows how we can update the codecs. Note that the custom codec should have a Decoder function that is TTN format (chirpstack codec formats are also supported now).

First we need to add a custom codec to WaziGate. We can use this Javascript code for that. We can run the Javascript code on a web browser's console provided that the WaziGate is connected to the same network as the PC being used.



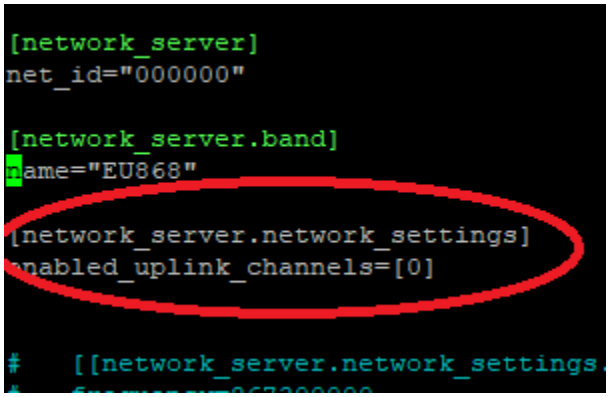
This will add a new codec called **SenseCap S2120** to WaziGate. The last step is to select this codec for the Dragino device that was setup on the WaziGate Dashboard.



Step 5: Restrict the chirpstack-network-server to tell the end device to only use one channel

To support very inexpensive single channel LoRa concentrators, with commercial LoRaWAN devices. We have to restrict the amount of used channels in the chirpstack network server. This channel mask shows the end device, which channels can be used, to communicate with the gateway device. There are four steps involved to implement those changes:

1. Connect to the Wazigate via ssh and navigate to:
   'cd /var/lib/wazigate/apps/waziup.wazigate-lora/chirpstack-network-server'
2. Open the file with the editor of your choice, we going to use nano in this example:
   'sudo nano chirpstack-network-server.toml'
3. Add the following two lines, below name="EU868":
   [network_server.network_settings]
   enabled_uplink_channels=[0]
   This sets the channel mask to only support channel 0, which is 868.1Mhz.
4. Reboot the gateway, issue '**sudo wazi-config**' and select "**Reboot Wazigate**".



Step 6 : Power on SenseCap S2120 Weather Station

To power the device insert the batteries.
To restart the device, press the config button. The device will send join requests to the gateway afterwards.

Step 7 : View SenseCapS2120 Weather Station on the WaziGate Dashboard

The SenseCapS2120 Weather Station join mode should be OTAA. This is the default join mode, but if it was changed, we can use the SenseCAP Mate app to change it.

Once the SenseCapS2120 Weather Station turns on, it will join the WaziGate network and start transmitting sensor data.