

LoRaWAN server configuration

towards hub.sensefarm.com

© Sensefarm Sept 2022

Example usage of the CUBE02 sensor serie with different LoRaWAN servers and operators



The collage illustrates the example usage of the CUBE02 sensor series across different LoRaWAN servers and operators:

- Sensefarm Hub Overview:** Shows 5 active devices and 0 alarm devices. A map view displays water temperature data: Vatten temperatur: 7.38 °C at a location near Skälderviken.
- Höganäs Energi Kontrollrummet:** A dashboard titled "Kontrollrummet" showing real-time bath temperature data for various locations: HÖGANÄS (8.9 °C), HÖGANÄS (8.8 °C), MÖLLE (8.9 °C), VIKEN (8.8 °C), TÖNSTORP (8.4 °C), and ARILD (8.8 °C).
- Google Map Integration:** A screenshot from Google Maps showing sensor locations with icons and data overlays. Specific data points include: 6.31 °C at Arild, 6.19 °C at Svanå, and 237 at Munkerup. A callout box for an RSSI failure shows detailed sensor data:

SPS	humidity-0	42 uPa
humidity-1	50 uPa	
temperature-stadd	20.17 °C	
temperature-1	19.38 °C	
humidity-2	200 uPa	
humidity-3	200 uPa	

Content

- Locating the encryption keys for Sensefarm products
 - <https://hub.sensefarm.com>
- Actility
 - <https://stadshubb.thingpark.com/portal/web/>
- Talkpool
 - <https://apps.talkpool.com/>
- Netmore
 - <https://portal.blink.services/home>
- Chirpstack
 - <https://www.chirpstack.io/>
- Ygg.io (version 2 and 3)
 - <https://ygg.io>
- The Things Network
 - <https://account.thethingsnetwork.org/>

Locating device encryption keys - 1 of 2

Keys are printed on the lid of the device



They are easier to copy from
Hub.sensefarm.com

Project roles needed
for access to keys:
Owner, Admin

A screenshot of a web browser displaying the Sensefarm Hub Members page at hub.sensefarm.com/members. The page has a dark sidebar on the left with the Sensefarm logo and links for Overview, Charts, Devices, and Actions. The main content area shows a table of members. The first member listed is blurred. The second member has a blue icon and the role "Owner" next to it. The third member has a red icon and the role "Viewer". The fourth member has a yellow icon and the role "Admin". A red circle highlights the "Manage Projects" button in the top right corner of the user menu. Another red circle highlights the "Admin" role next to the third member's name. At the bottom right, there are "Remove" buttons for the Admin and Viewer roles.

Locating device encryption keys - 2 of 2

Hub.sensefarm.com

Find device
Press Edit

Settings needed for ABP

devEUI
devAddr
appSkey
nwkSkey

The screenshot shows the sensefarm.com web interface. On the left, a sidebar menu includes 'Overview', 'Charts', 'Devices' (which is highlighted with a red circle), 'Actions', 'Chat', and 'Members'. The main area displays a device detail page for 'Halmstadgården Norr centrum 205'. The page has sections for 'Admin area' (Project Owner) and 'Device information'. The 'Device information' section lists the following details:

Name	Halmstadgården Norr centrum 205
Type	CUBE02
ID	[REDACTED]
Connected Gateway	B82 [REDACTED] 88
Source	sensefarm-lora
Latest report	November 18th 2020, 17:04:22
Latest Message Interval	10 minutes

A 'Hide Advanced Info' button is circled in red. Below it, the 'Keys' section is circled in red and contains the following fields:

Join Type	ABP
Class	A
devAddr	01000205
nwkSKey	42E3F[REDACTED]B1C73D
appSKey	224C[REDACTED]246

At the bottom, there is a section for 'Uplink Payload (Raw Data)'.

Cube02 sensors are locked down to use ABP and SF12 to work in rapidly changing outdoor radio environments.

OTAA and ADR requires good bi-directional radio coverage which can not be guaranteed all year around due to leafs and sudden rain.

Actility configuration

<https://stadshubb.thingpark.com/portal/web/>

Adding a device

Manufacturer - Generic
Model - very important to
get correct, many similar
variants:

LoRaWAN 1.0.2 rev B
Class A
Rx2_SF12
eu868

The screenshot shows the Sensefarm Hub device manager interface. On the left, a sidebar lists categories like Devices, Multicast groups, Connectivity plans, AS routing profiles, Application servers, and Settings. Under Devices, a tree view shows nodes such as CUBE01-TW-70B3D554600, sensefarm-cube01-tw, sensefarm-cube02, and sensefarm-cube01-tw. A red circle highlights the 'Create' button in the main toolbar. Another red circle highlights the 'Create' button in the top right corner of the 'New device' dialog.

New device

Administrative data

- Device name: Test - 70B3D5546000EFB
- Marker:
- Administrative info: [empty input]
- Administrative location: * 55° 43' 1" N 13° 13' 30" E
- Motion indicator: Random

Device identification

- Manufacturer: * Generic
- Model: * LoRaWAN 1.0.2 revB - class A - Rx2_SF12 eu868
- Device activation: Activation By Personalization (ABP)
- DevEUI: * 70B3D5546000EFB
- DevAddr: * 01000EFB
- NwkSKey: * E32 5E0A5F4

Network parameters

- Connectivity plan: ORESUNDSKRAFT Connectivity Supplier / ORESUNDSKRAFT Bas (999)

Application layer handling

- Application server routing profile: sensefarm-cube02
- AppSKeys:

AppKey	Port
D7D9	04E8

v10.18.3-8337ec824 ©2019 Actility

Security

The device frame counter used by the crypto inside the device is reset to Zero upon reset (press internal black button) of CUBE01 and CUBE02
(Should be done when battery is changed)

Thus options such as “Disable frame-counter validation” should be set on all LoRa-WAN servers for easy operation.

Actility has a button called “Reset security context” for this.

The screenshot shows a web-based interface for managing a device named CUBE02-70B3D554600000C8. The left sidebar lists various device configurations under 'ThingPark Wireless' and 'Devices'. A red circle highlights the 'Settings' option under the 'Network' section. The main panel is titled 'Node settings' and contains two tabs: 'Alarm Settings' and 'Troubleshooting'. Under 'Alarm Settings', there are sections for 'No uplink activity alarm settings' and two checkboxes for 'Activate threshold1' and 'Activate threshold2', each with a trigger dropdown set to 'After 2 days of inactivity'. Under 'Troubleshooting', there is a 'Security context' section with a red circle around the 'Reset security context' button. The top right corner shows a user profile for 'Anders Hedb'.

Set up connection to hub.sensefarm.com - 1 of 2

The screenshot shows the Sensefarm AB - ThingPark Wireless deviceManager interface. The left sidebar displays navigation options: Devices (selected), Network, Settings, Alarms (5), History, Multicast groups, Connectivity plans, AS routing profiles, Application servers (highlighted with a red circle), and Settings. The main area is titled "Application servers". A blue header bar says "Add application servers" and has a "Create" button highlighted with a red circle. Below this is a table titled "Application servers" with columns: Name, ID, Status, and Type. It lists two entries: "sensefarm-cube01-tw" (TWA_100039957.39645.AS, Active, HTTP Application Server (LoRaWAN)) and "sensefarm-cube02" (TWA_100039957.39642.AS, Active, HTTP Application Server (LoRaWAN)). At the bottom, a modal window titled "New application server" is open, showing fields for "Name:" and "Type:". The "Type:" dropdown menu is open, showing four options: "HTTP Application Server (LoRaWAN)" (selected), "HTTP Application Server (LoRaWAN)", "HTTP Application Server (Cellular)", and "Kafka Cluster".

Name	ID	Status	Type
sensefarm-cube01-tw	TWA_100039957.39645.AS	Active	HTTP Application Server (LoRaWAN)
sensefarm-cube02	TWA_100039957.39642.AS	Active	HTTP Application Server (LoRaWAN)

Set up connection to hub.sensefarm.com - 2 of 2

Currently implemented
API's -

<https://actility.sensefarm.com/CUBE02>

<https://actility.sensefarm.com/CUBE01-TW>

Use the correct one for the devices you have.
CUBE version is printed on device label and
available on hub.sensefarm.com device page
under "Factory defaults".

The "Tunnel interface authentication key" is
Available for customers upon request, but
turned off by default.

The screenshot shows the ThingPark Wireless application interface for managing devices and application servers. On the left, a sidebar lists 'Devices' (including a CUBE02 device), 'Multicast groups', 'Connectivity plans', 'AS routing profiles' (containing 'sensefarm-cube01-tw'), 'Application servers' (containing 'sensefarm-cube02' and 'sensefarm-cube01-tw'), and 'Settings'. A red circle highlights the 'sensefarm-cube02' entry under Application servers. A large black arrow points from the bottom-left 'Uplink/downlink security configuration' window to this highlighted entry. The main central area displays the 'Application server' configuration for 'sensefarm-cube02'. The 'Content Type' field is set to 'JSON' (circled in red). The 'Type' field is set to 'HTTP Application Server (LoRaWAN)'. The 'Status' field is set to 'Active' (also circled in red). Below this, the 'Uplink/downlink security' section shows 'Status: Active', 'AS ID: hub-cube02', and 'Max timestamp deviation: 60 seconds'. In the bottom right, a 'Routes' section shows a single route with a destination URL: 'https://actility.sensefarm.com/CUBE02' (circled in red). The 'Uplink/downlink security configuration' window at the bottom left contains fields for 'AS ID: hub-cube02', 'Tunnel interface authentication key: BE-C4-99-C6-9E-9C-93-9E-41-3B-66-39-61-63-6C-61', and 'Max timestamp deviation (seconds): 60'. It includes 'Save' and 'Close' buttons.

Feeding sensor data to multiple applications from Actility

Only needed if sensor packets should be sent to more services than hub.sensefarm.com
(requestinspector.com is a nice debugging tool as an example)

Add an extra application server.

Add the application to the routing profile used.

The screenshot shows the configuration of an Application Server named "Request inspector". The "Application server" tab is active, displaying fields for Name (Request inspector), ID (TWA_100039957.45432.AS), Content Type (JSON), Type (HTTP Application Server (LoRaWAN)), and Status (Active). Below this, the "Uplink/downlink security" tab shows an Inactive status with a note about max timestamp deviation. The "Route" tab specifies source ports (*) and a blast routing strategy. The "Destinations" tab lists a single destination URL: <https://requestinspector.com/p/01e62007pkde0ttmgeq5a1jmf>. A red circle highlights the "Request inspector" application under the "Application servers" section in the left sidebar.

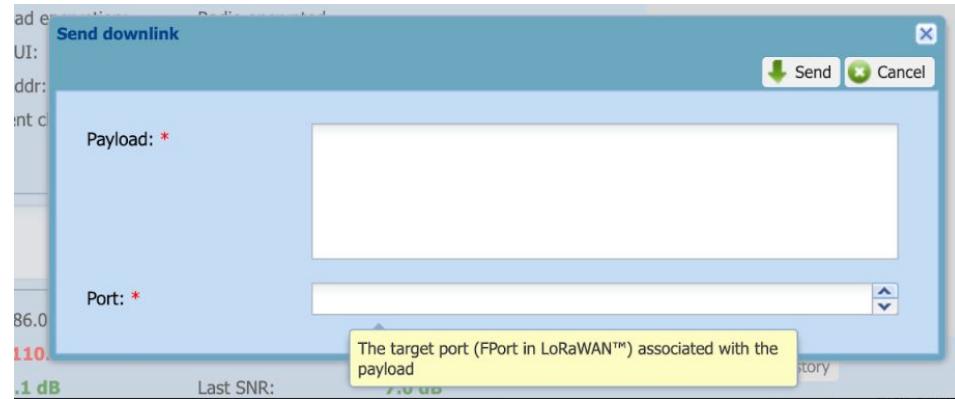
The screenshot shows the configuration of an AS routing profile named "sensefarm-cube01-tw". The "AS routing profile" tab is active, displaying fields for Name (sensefarm-cube01-tw), ID (TWA_100039957.34218), Type (LoRaWAN), and Is default (unchecked). The "Destinations" tab lists two entries: "Local application server" with Destination "sensefarm-cube01-tw" and another "Local application server" entry with Destination "Request-inspector". A red circle highlights the "sensefarm-cube01-tw" routing profile under the "AS routing profiles" section in the left sidebar.

Sendind downlink data

Downlink messages can change the update interval.
Some pre-defined values can be found on this link -

<https://github.com/Sensefarm/protocols/blob/master/Sensefarm-LPP.md#downlink-pre-defined-example-messages>

Cube02 does not care about Fport, so set it to 1.



Talkpool configuration with hub.sensefarm.com

<https://apps.talkpool.com/>

Talkpool

apps.talkpool.com

Https URL:

<https://talkpool.sensefarm.com>

Include radio parameters = Yes

The screenshot shows a web browser window with multiple tabs open. The active tab is 'apps.talkpool.com/#/application/70-B3-D5-54-60-00-00-00/customer_servers'. The page title is 'Edit Customer Server' under the 'Customer Servers' section. The 'Customer Server Configuration form' contains the following fields:

- Customer Server Name:** SensefarmHub
- If Enabled, will include the LoRa radio parameters for the device frames**: A radio button labeled 'Yes' is selected.
- Protocol Type:** A dropdown menu set to 'HTTP(S)'
- HTTP(S) URL:** A text input field containing 'https://talkpool.sensefarm.com'

At the bottom of the configuration form are 'Update' and 'Cancel' buttons. Below the configuration form is a table titled 'Customer Servers' with one entry:

Name	Include Radio Parameters	Protocol Type	Configuration Data	Actions
SensefarmHub	Yes	HTTP	URL: https://talkpool.sensefarm.com	

At the bottom of the table, it says 'Showing 1 to 1 out of 1 entries'. Navigation buttons at the bottom right include 'First', 'Previous', 'Next', and 'Last'.

Talkpool - Adding a device. “.” “-” must be inserted into EUI and Address fields

admin area

Owner

device information

Name	70B3D554600001C1
Type	CUBE02
Source	sensefarm
D	70B3D554600001C1
Latest report	May 13th 2020, 10:33
Latest Message Interval	No Info

Factory Defaults

```
{  
  "uniqueId": "333747073636373734004800",  
  "devEUI": "70B3D554600001C1",  
  "appEUI": "70B3D554600001C1",  
  "appKey": "2A749B3488D5997101CE",  
  "devAddr": "010001C1",  
  "appSKey": "C5487683D17389DF731111",  
  "nwkSKey": "E0FD04CC4779F0D7B5FAD",  
  "generated": "2020-05-13T08:05:30.142Z",  
  "abp": true,  
  "sync": true}
```

The screenshot shows the Talkpool web application interface. On the left, there's a sidebar with 'Talkpool' branding and navigation links for Home, Applications, and Network Activity. The main content area has a blue header bar with the text 'Home / Applications / 70-B3-D5-54-60-00-00-00 / Personalised Devices'. Below the header, there are tabs for Info, Devices, Traffic, Over-The-Air Devices, Personalised Devices (which is selected), and Customer Servers. A sub-header 'SensefarmTest (70-B3-D5-54-60-00-00-00)' is displayed. The central part of the screen is titled 'Add New Personalised Device' with the sub-instruction 'To Configure a Personalised Device, please enter Device EUI, Network Address, Application Session Key and Network Session Key'. It contains four input fields: 'Device EUI' (containing '70-B3-D5-54-60-00-01-C1'), 'Network Address' (containing '01:00:01:C1'), 'Application Session Key' (containing 'C5487683D17389DF731111'), and 'Network Session Key' (containing 'E0FD04CC4779F0D7B5FAD'). At the bottom right of this form are 'Add Device' and 'Cancel' buttons. Below this form, a table titled 'Personalised Devices Configured to the Application' lists entries. The first entry in the table corresponds to the device being added, with its details (Device EUI, Network Address, Application Session Key, Network Session Key) also visible above the table. The table includes columns for Device EUI, Network Address, Application Session Key, Network Session Key, and Actions (with icons for edit, delete, and refresh).

Talkpool

Devices must be tagged “CUBE02” for hub.sensefarm.com to accept them.

The screenshot shows a web browser displaying the Talkpool device settings interface. The URL in the address bar is `apps.talkpool.com/#/device/70-B3-D5-54-60-00-01-83/settings`. The page title is "Home / Devices / 70-B3-D5-54-60-00-01-83 / Settings". The main content area is titled "CUBE02 (70-B3-D5-54-60-00-01-83)". Below this, there are tabs for "Info", "Traffic", "Downlink", and "Settings", with "Settings" being the active tab. Under "Settings", there are sub-tabs for "Identification Info" and "Build Info", with "Identification Info" being the active tab. On the right side of the page, there is a section titled "Device Build Info" which includes fields for "Vendor" and "Model". The "Model" field contains the value "CUBE02", which is circled in red. Below these fields are sections for "Firmware", "Serial Number", and "Lora Version", each with their respective input fields.

apps.talkpool.com/#/device/70-B3-D5-54-60-00-01-83/settings

Home / Devices / 70-B3-D5-54-60-00-01-83 / Settings

CUBE02 (70-B3-D5-54-60-00-01-83)

Info Traffic Downlink Settings

Identification Info Build Info

Device Build Info

Vendor

Alphanumeric String (Max 50 Characters), Allowed Special Characters (-)
Enter Vendor

Model

Alphanumeric String (Max 50 Characters), Allowed Special Characters (- @ . : _)
CUBE02

Firmware

Alphanumeric String (Max 50 Characters), Allowed Special Characters (- @ . : _)
Enter Firmware

Serial Number

Alphanumeric String (Max 50 Characters), Allowed Special Characters (- @ . : _)
Enter Serial Number

Lora Version

Alphanumeric String (Max 50 Characters), Allowed Special Characters (- @ . : _)
Enter Lora Version

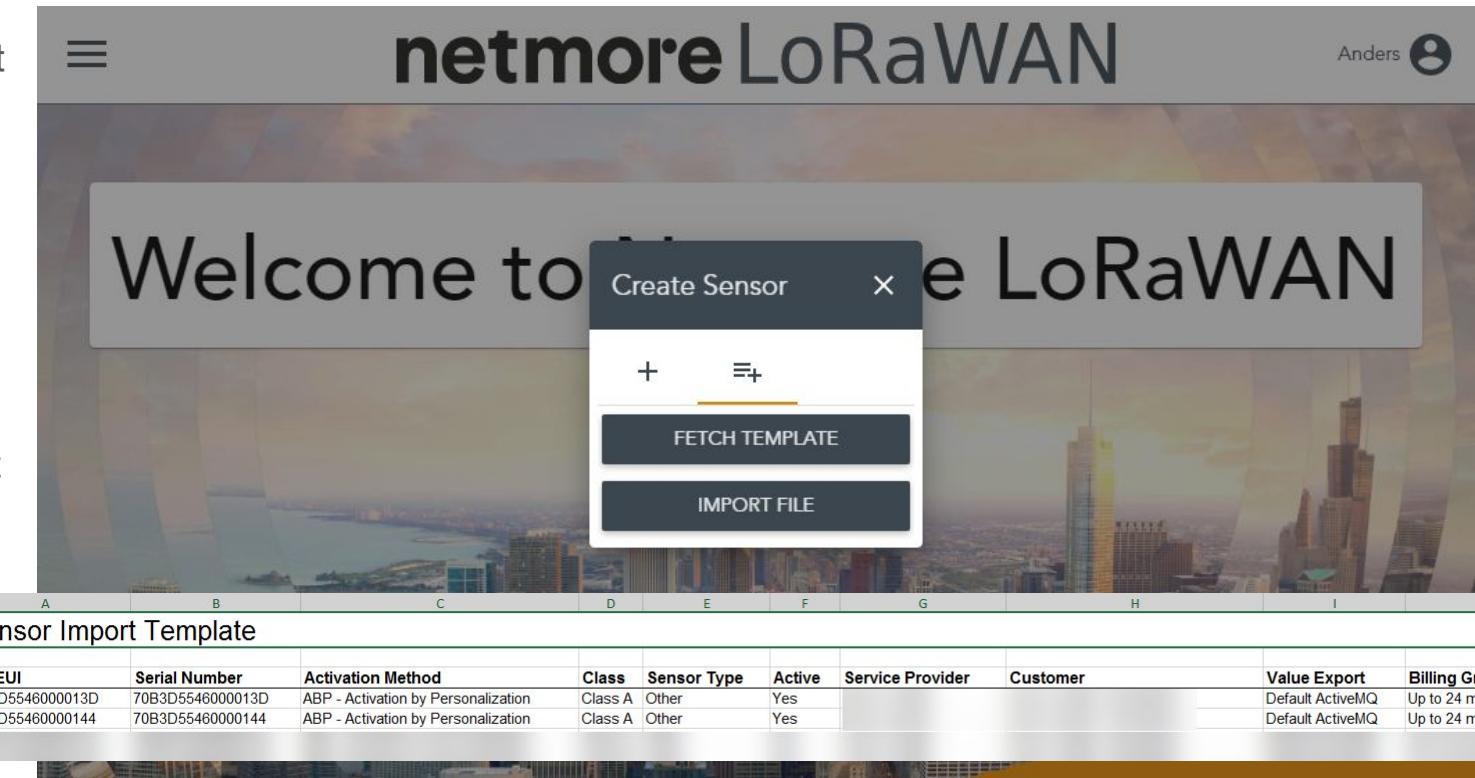
Netmore configuration with hub.sensefarm.com

<https://portal.blink.services/home>

We really recommend the batch creation

Do one sensor manually, check that it works. *Some hidden values can only be set by Netmore support!*

Then do the batch creation:
Create Sensor, Select batch, Fetch the template, Open it in excel, Fill it with values, re-import

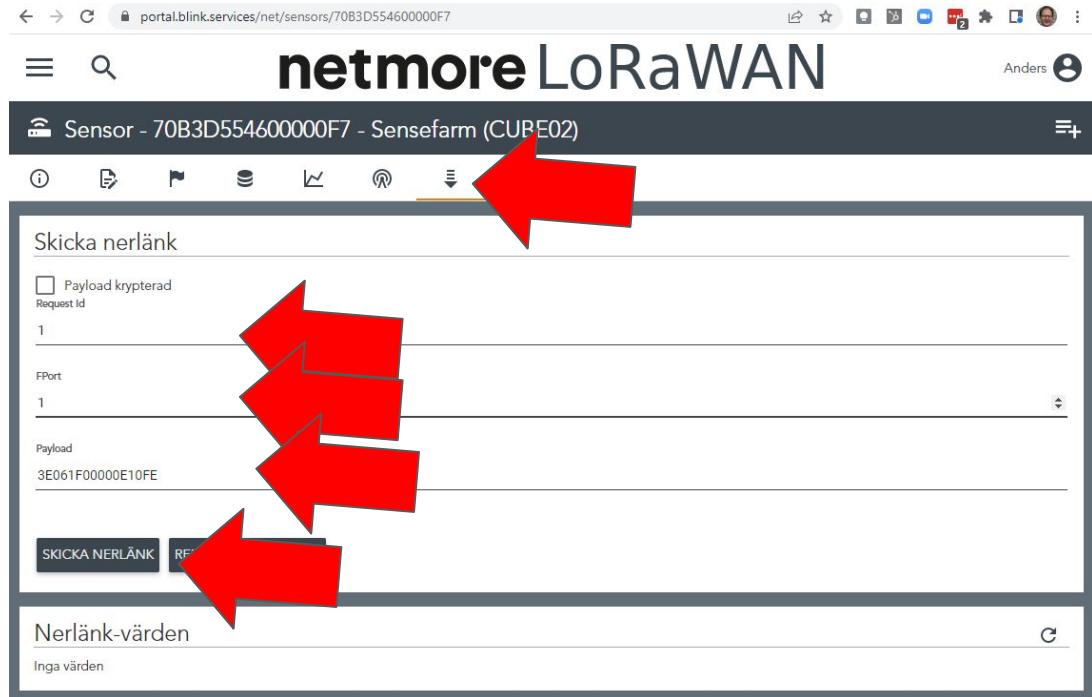


Downlink changes of timing

Downlink messages can change the update interval.
Some pre-defined values can be found on this link -

<https://github.com/Sensefarm/protocols/blob/master/Sensefarm-LPP.md#downlink-pre-defined-example-messages>

Cube02 does not care about Fport, so set it to 1.



Transferring data to hub.sensefarm.com

For a new customer that wish to use hub.sensefarm.com with their own account at the Netmore Lorawan portal, a new MQTT topic must be set up by the Netmore support team.

Sensefarms mqtt-data-account must also be allowed to listen to the new topic, so please contact Sensefarm to work this out with the Netmore Support.

Chirpstack

<https://www.chirpstack.io/>

Chirpstack

The image displays three screenshots of the ChirpStack Application Server interface:

- Screenshot 1: Device-profiles / localhost**
 - Shows the "Device-profile name" field set to "localhost".
 - Shows the "LoRaWAN MAC version" field set to "1.0.3".
 - Shows the "Uplink interval (seconds)" field set to "600".
 - Contains a red circle around the "Device-profile name" field.
 - Contains a red circle around the "LoRaWAN MAC version" field.
 - Contains a red circle around the "UPDATE DEVICE-PROFILE" button.
 - Contains a red circle around the "Device-profiles" link in the sidebar.
- Screenshot 2: Applications / localhost / Devices / Create**
 - Shows the "Device name" field set to "70B3D55460000154".
 - Shows the "Device EUI" field set to "70 B3 D5 54 60 00 01 54".
 - Shows the "Device-profile" field set to "localhost".
 - Contains a red circle around the "Device EUI" field.
 - Contains a red circle around the "Device-profile" field.
 - Contains a red circle around the "Disable frame-counter validation" checkbox, which is checked.
 - Contains a red circle around the "Applications" link in the sidebar.
- Screenshot 3: Applications / localhost / Devices / 70B3D55460000154**
 - Shows the "Device address" field set to "01 (54".
 - Shows the "Network session key (LoRaWAN 1.0)" field set to "1e 85 0 7 a9 5e e9".
 - Shows the "Application session key (LoRaWAN 1.0)" field set to "B2 1C 4B AF AE".
 - Contains a red circle around the "Device address" field.
 - Contains a red circle around the "Network session key" field.
 - Contains a red circle around the "Application session key" field.

Create a device profile

1.0.3 protocol (or less)

Application

Mark “Disable frame-counter-validation” !

Activation-tab will show for ABP keys entering

Yggio

<https://ygg.io>

Yggio version 2

Select IoT-nodes

Press “New IoT-node” at the top of the screen and follow the wizard. Device model name is “sensefarm-cube02-sm”

Select the new node from the list.

Obs! There is a translated xxx(simple-lora-node)

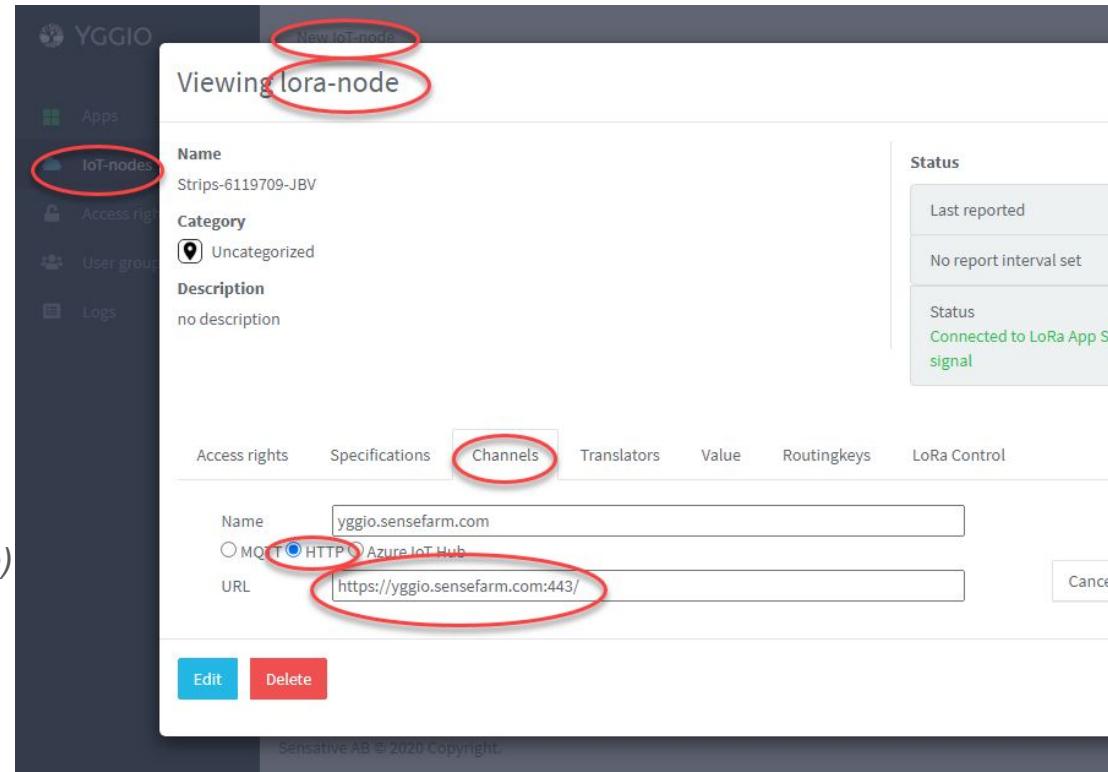
Do not select that node as we need the raw data!

Select Channels

Select HTTP

Enter URL:

<https://yggio.sensefarm.com:443/>



Yggio version 3 (<https://kraftringen.yggio.net>)

Login, click "New IoT node" (it's not marked as a button)

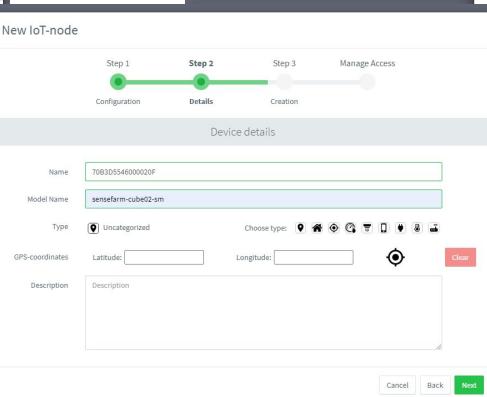
Select "Lora", "Actility Thingpark", "ABP"

Enter correct values (found on hub.sensefarm.com -> Devices->Edit->Show Advanced Info) for Device ID, Device address, Network Session Key, Application Session Key.

Select "Class A", "Next"

Name the device, select Model Name: "sensefarm-cube02-sm"

Press Next, Create. Skip privileges/sharing if not needed.



Once created, do...

Select the node again from the list.

Select "Channels"->"HTTP"

Enter "https://yggio-kraftringen.sensefarm.com:443/"

Name	70B3D5546000020F
Category	(location icon)
Description	no description
Status	Last reported: Never No report interval set Status: Connected to Krafringen-Thingpark-Connector, Signal unknown

New IoT-node

Map Filter by device

Viewing (30/42) devices

▲ Name

70B3D55460000209

Viewing ActilityThingpark Device

Name: 70B3D5546000020F

Category: (location icon)

Description: no description

Status: Last reported: Never
No report interval set
Status: Connected to Krafringen-Thingpark-Connector, Signal unknown

New IoT-node

Step 1 Step 2 Step 3 Manage Access

Configuration Details Creation

Device configuration

Device type: Z-Wave Gateway, Z-Wave Device, LoRa, NB-IoT, Wireless M-Bus, Generic, ENUMERABLE STATE, Astro Clock, CoAP, LoRaWAN Server Connector, Bus2 Gateway, Sodae, The Things Network Connector, Netcore Connector, Metri Meter, Metri Connector

Connector: Actility Thingpark -> Krafringen-Thingpark-Connector

Type: ABP

Device ID (devEui): 70B3D5546000020F

Device Address (devAddr): 004e746

Network Session Key (nwksKey): 2b7e151628aed2zaabf7158809cf4fc

Application Session Key (appSKey): 2b7e151628aed2zaabf7158809cf4fc

Device Profile ID: Class A (green), Class C (blue)

Access rights, Specifications, Channels, Routingkeys, LoRa Control, Connection

Name: My application

Type: MQTT (radio button), HTTP (radio button, selected), Azure IoT Hub (radio button)

URL: https://yggio-kraftringen.sensefarm.com:443/

Cancel Add Close

The Things Network

<https://console.thethingsnetwork.org/>

The Things Network

CUBE series of devices

The Cube-02 DevAddr can not be configured from the web-interface.

The TTN command line tool is needed, please check out "ttnctl devices set" on this page

[https://www.thethingsnetwork.org/docs/network/
cli/api.html](https://www.thethingsnetwork.org/docs/network/cli/api.html)

The TTN CLI tool can be downloaded from
[https://www.thethingsnetwork.org/docs/network/
cli/quick-start.html](https://www.thethingsnetwork.org/docs/network/cli/quick-start.html)

Hub.sensefarm.com

For connecting to hub.sensefarm.com, please contact info@sensefarm.com