



LoRa WAN

The Things Network

MQTT / Node-Red

Unterschied LoRa / LoRaWAN?

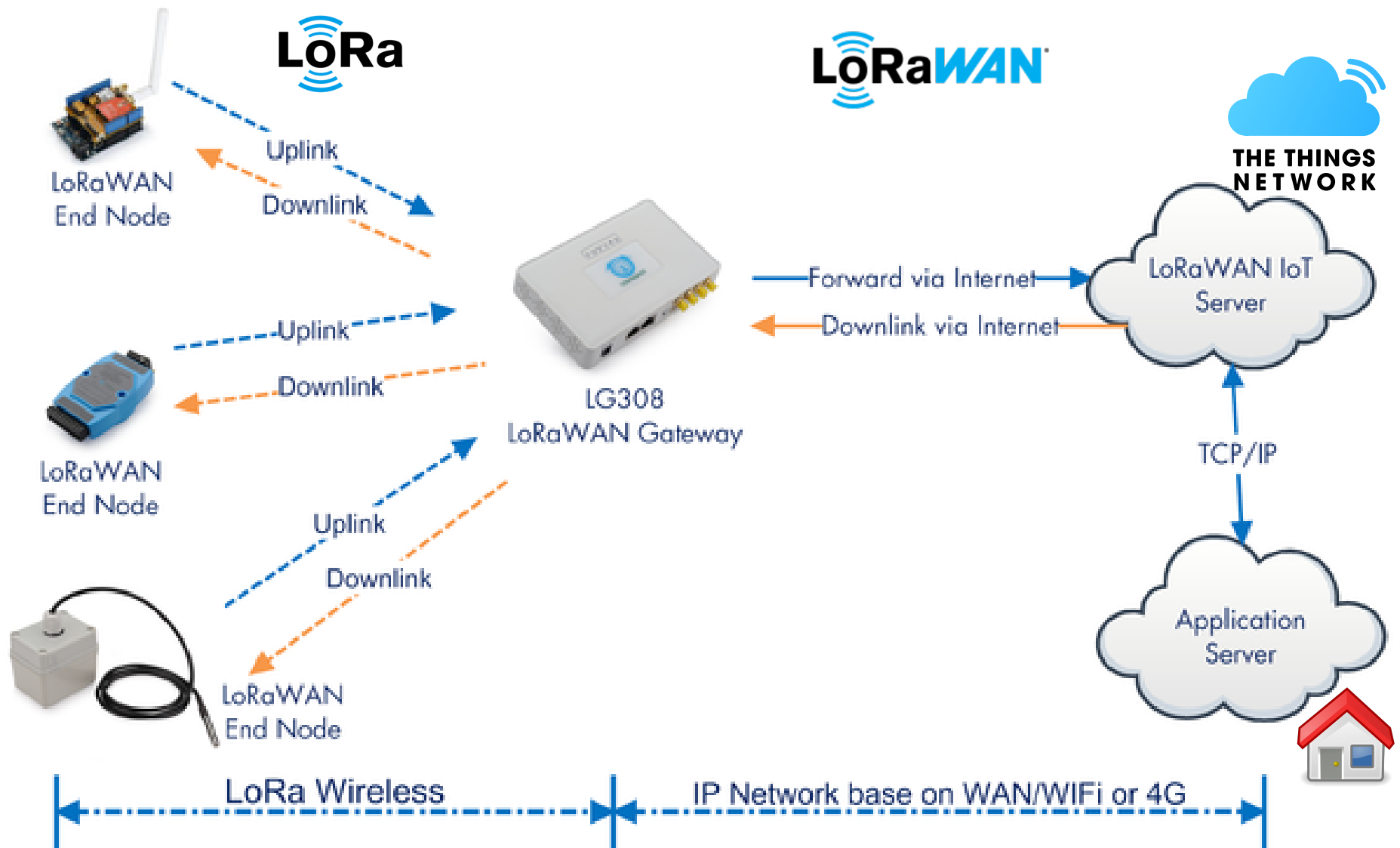
- **LoRa** beschreibt die physikalische Schicht, welche die „**long range**“ Kommunikationsverbindung ermöglicht (HF-Strecke).



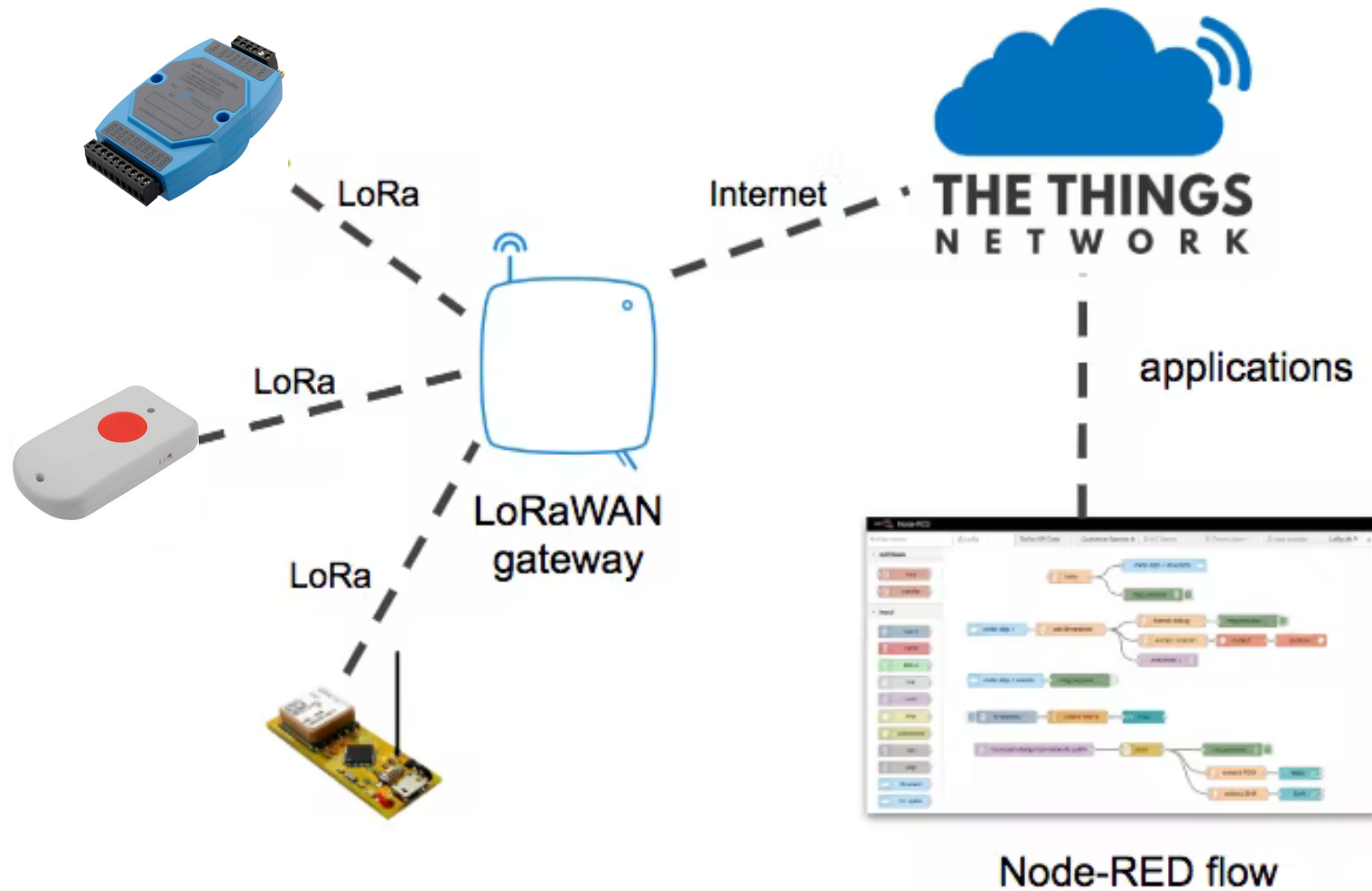
- **LoRaWAN** definiert das Standard Kommunikationsprotokoll und die Systemarchitektur für das Netzwerk (HF und Netzwerk).



LoRa / LoRaWAN



Sensors - Gateway - Network - Node-Red



Reichweite / Datenrate

- Europa: lizenzfreie Frequenzen 867-869 MHz.
- Die Reichweite beträgt im Stadtgebiet etwa 2 km, im Umland werden 10 bis 15 km erreicht, auf dem Land bis zu 40 km.
- Die maximale Datenrate liegt zwischen 0,2 und 10 kBit/s.
- LoRa ist zum Senden von **kleinen Datenpaketen** gedacht, etwa für Sensoren, die nur melden ob etwas ein- oder ausgeschaltet ist.

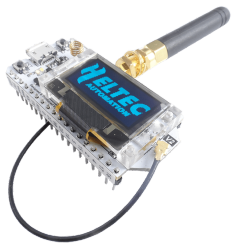
Sensors (Beispiele)



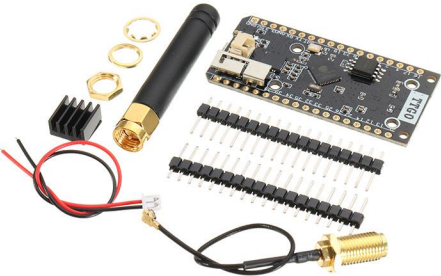
GPS Modul mit Notruftaste
Dragino LGT-92



I/O Controller Node
Dragino LT-2222-L



ESP32 Modul mit OLED Display
Heltec



ESP32 Modul ohne Display
TTGO

Gateway (Beispiele)



Indoor Gateway

LPS8 Indoor Multichannel
LoRaWAN Gateway

*Anschluss SMA für externe
Antenne*



Outdoor Gateway

DLOS8 Outdoor Multichannel
LoRaWAN Gateway

Wichtig nur Multichannel
(8 Kanäle) verwenden

Radio configurations

SF: Spreading Factor

BW: Bandbreite

Configuration	Bitrate (bits/sec)	Max payload size (bytes)	Airtime (ms)
SF12 / 125 kHz	250	51	2793.5
SF11 / 125 kHz	440	51	1560.6
SF10 / 125 kHz	980	51	698.4
SF9 / 125 kHz	1760	115	676.9
SF8 / 125 kHz	3125	222	655.9
SF7 / 125 kHz	5470	222	368.9
SF7 / 250 kHz	11000	222	184.4

The Things Network

SF 12 or SF 11 are not allowed.
Use SF9 or SF7

Datarate used: SF7BW125

Fair use policy

On The Things Network's **public community network** a Fair Use Policy applies which limits the uplink **airtime to 30 seconds per day** (24 hours) per node and the downlink messages to **10 messages per day** (24 hours) per node.

Transmit 16 Bytes Payload + 13 Bytes Overhead

SF7 BW125	Max 448 Msg/24h	18.7 Msg/h	1 Msg alle 3,3 Min
SF12 BW125	Max 18 Msg/24h	0.8 Msg/h	1 Msg alle 80 Min

LoRaWAN airtime calculator

<https://avbentem.github.io/airtime-calculator/ttn/eu868>

The Things Network Homepage

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



[Learn](#)

[Hardware](#)

[Forum](#)

[Community](#)

[Conference](#)

[Enterprise](#)

[Log in](#)

[Sign up](#)

We are a global collaborative Internet of Things ecosystem that creates networks, devices and solutions using LoRaWAN®.

[Start building](#)

[Learn more](#)



Sign up klicken

Konto eröffnen



CREATE AN ACCOUNT

Welcome aboard! Fill in your details to create an account on The Things Network and start exploring the world of LoRaWAN.

USERNAME

Your public name.



PRIG_01

EMAIL ADDRESS

Your email address stays private. An activation email will be sent to you shortly (please check your spam folder).



my_email_address@prig.ch

PASSWORD

Use at least 6 characters.



.....

NEWSLETTER

Subscribe to the newsletter.



Create account

Benutzername wählen

(Sonderzeichen vermeiden)

Bsp «prig-01» und nicht «PRIG_01»

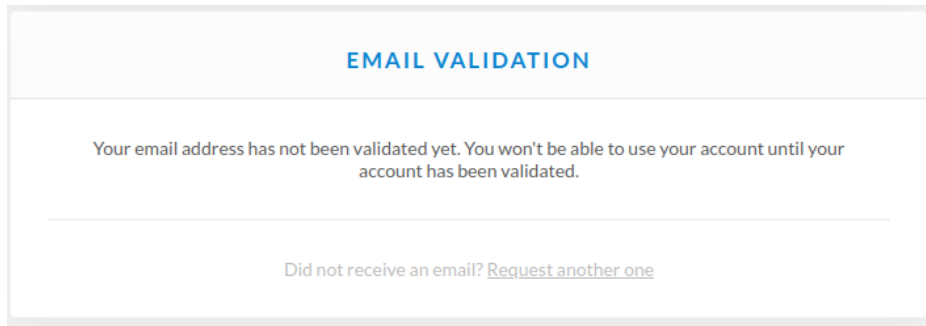
E-Mail Adresse eingeben

Passwort wählen

Newsletter (Optional)

[Create account] klicken

Konto aktivieren (E-Mail)



E-Mail Inhalt



E-Mail öffnen

[Activate account]

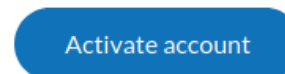


klicken

ACCOUNT VERIFICATION

You recently registered an account at [The Things Network](#) using this email address.

Please activate your account by clicking the button below.



Sonderzeichen in Benutzername

Ausgewählt: PRIG_01

Login mit PRIG_01 Nicht möglich...

Wurde im Hintergrund geändert zu:

PRIG-01 oder prig-01

Hinweis:

Sonderzeichen in Benutzername vermeiden.

Login



The screenshot shows the "The Things Network Cluster Picker" interface. At the top, there is the logo and the text "THE THINGS NETWORK". Below that, the title "The Things Network Cluster Picker" is displayed, followed by the instruction "Select a cluster to start adding devices and gateways." The interface lists three clusters: "Europe 1" (eu1 - Dublin, Ireland), "North America 1" (nam1 - California, United States), and "Australia 1" (au1 - Sydney, Australia). A red arrow points from the "Europe 1" cluster in the screenshot to the "Europe 1" text in the adjacent text block.

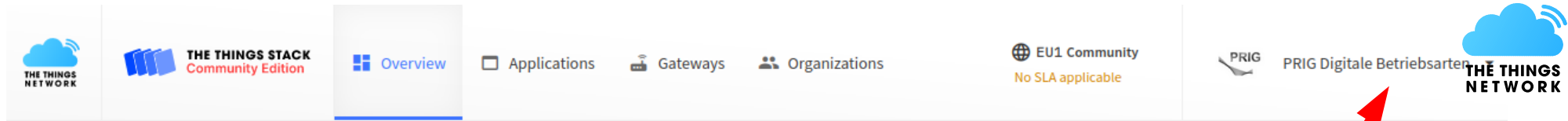
Login to:
<https://console.cloud.thethings.network/>

Europe 1
wählen

oder direkt einloggen bei:

<https://eu1.cloud.thethings.network/console/>

Console Overview



**Application erstellen
Gerät eingeben / verwalten**

Welcome to the Console!

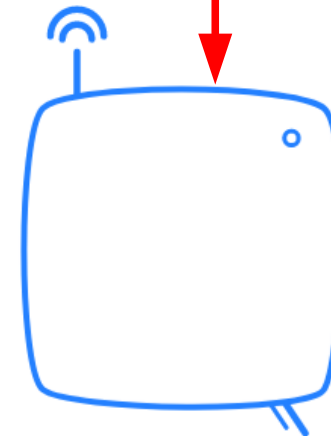
**Profildaten anpassen
(Logo / Name)**

Get started right away by creating an application or registering a gateway.

Need help? Have a look at our [Documentation](#) or [Get support](#).



Create an application



Register a gateway

Console Overview



THE THINGS STACK
Community Edition

Overview

Applications

Gateways

Organizations

EU1 Community

No SLA applicable

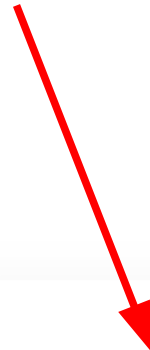


PRIG Digitale Betriebsarten



Application erstellen
Gerät eingeben / verwalten

Welcome to the Console!

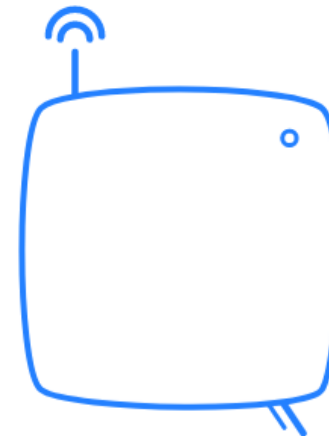


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Create an application



Register a gateway



Application erstellen



Add application

Owner *

prig-01

Application ID *

workshop-01

Application name

Demo Workshop PRIG

Description

Description for my new application

Optional application description; can also be used to save notes about the application

Create application

Owner:

Konto Name «prig-01»

Application ID:

Name darf nur 1x existieren

Nur Kleinbuchstaben

Kein Leerschlag

Application name: optional

Description: optional

[Create application] klicken

(Sonderzeichen vermeiden)

Sensor / Gerät einfügen (Device)



Eine «Application» kann mehrere «Devices» enthalten

The screenshot shows the TTN application management interface for an application named "Demo Workshop PRIG" with ID "workshop-01". The interface includes a header with the application name and ID, a status bar showing "No recent activity", "0 End devices", "1 Collaborator", and "0 API keys". Below this, there are two main sections: "General information" and "Live data".

General information:

Application ID	workshop-01
Created at	Dec 30, 2021 11:21:12
Last updated at	Dec 30, 2021 11:21:12

Live data:

- 11:21:12 workshop-01 Create application

A red arrow points from the text "Sensor / Gerät (end device) eingeben" to the "+ Add end device" button at the bottom right of the interface.



Benötigte Informationen

Marke / Typ / Version: Dragino / LT22222-L / FW 1.5.6

Frequency Plan: Europe 863-870 MHz
(SF9 for RX2 – recommended)

DevEUI:

AppEUI:

AppKey:

AppSKey:



Kleber auf Verpackung.
Alternative: vom Gerät ablesen/eingeben
mit Serielle Schnittstelle

Auswahl nach Marke / Typ



Register end device

From The LoRaWAN Device Repository

Manually

1. Select the end device

Brand [?]*

Dragino Technology Co.,...

Model [?]*

LT22222-L

Hardware Ver. [?]*

Unknown ...

Firmware Ver. [?]*

1.5.6

Profile (Region) *

EU_863_870



LT22222-L

MAC V1.0.3, PHY V1.0.3 REV A, Over the air activation (OTAA), Class C

The Dragino LT22222-L is a LoRaWAN® I/O module that contains different I/O Interfaces such as analog current input, analog voltage input, relay output, digital input, and digital output. The LT series I/O modules are designed to simplify the installation of I/O monitoring.

[Product website](#) [Data sheet](#)

Geräte Daten eingeben (1)



2. Enter registration data

Frequency plan ⓘ *

Europe 863-870 MHz (SF9 for RX2 - recommended) | v

AppEUI ⓘ *

12 00 00 00 00 00 01 51

Fill with zeros

DevEUI ⓘ *

10 40 41 B4 F1 82 F1 AA

Generate

1/50 used

AppKey ⓘ *

f3 BE FE 68 E8 E3 F8 7C C6 F5 FB 9E 21 26 BA 7E

Generate

End device ID ⓘ *

prig-dragino-lt22222

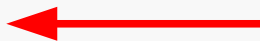
This value is automatically prefilled using the DevEUI

After registration

View registered end device

Register another end device of this type

Register end device



Frequency Plan:

Europe 863-870 MHz
(SF9 for RX2 – recommended)

AppEUI, DevEUI, AppKey

Gemäss Kleber auf Verpackung

End device ID:

eui-a04041b4f182f1aa

This value is automatically prefilled using the DevEUI

Geändert auf:

prig-dragino-lt22222

End device ID must contain only lowercase letters, numbers and dashes (-)

Geräte Daten eingeben (2)



Network layer

LoRaWAN network-layer settings, behavior and session

Frequency plan [?]*

Europe 863-870 MHz (SF9 for RX2 - recommended)

LoRaWAN version [?]*

MAC V1.0.2

Regional Parameters version [?]*

PHY V1.0.2 REV B

LoRaWAN class capabilities [?]

- Supports class B
- Supports class C

Activation mode [?]*

- Over the air activation (OTAA)
- Activation by personalization (ABP)
- Define multicast group (ABP & Multicast)

Session and MAC state reset [?]

Reset session and MAC state

Advanced MAC settings [?] ▾

Save changes

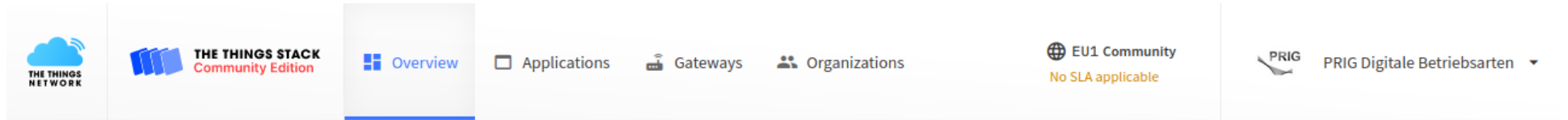
LoRaWAN version:
MAC V1.0.2

Regional Parameters version;
PHY V1.0.2 REV B

LoRaWAN class capabilities:

- Support class B (Nicht ankreuzen)
- Support class C (Nicht ankreuzen)

2. Gerät eingeben



Welcome back, PRIG Digitale Betriebsarten! 🌟

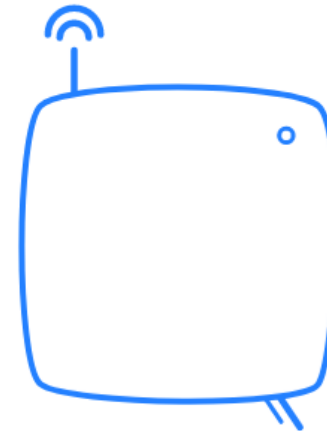
Walk right through to your applications and/or gateways.

Need help? Have a look at our [Documentation](#) or [Get support](#).

**Application / Gerät
erstellen / eingeben / verwalten**



Go to applications



Go to gateways

Applications / Device

The screenshot shows the TTN Applications page. At the top, there are navigation tabs: Overview, Applications (selected), Gateways, and Organizations. On the right, there are settings for 'EU1 Community' (No SLA applicable) and 'PRIG' (PRIG Digitale Betriebsarten). Below the navigation, there is a search bar labeled 'Search by ID' and a blue button labeled '+ Add application'. A table below shows one application with the ID 'workshop-01' and the name 'Demo Workshop PRIG'. Two red arrows point to the 'workshop-01' ID and the '+ Add application' button.

ID	Name	Description
workshop-01	Demo Workshop PRIG	

Neue «Application» erstellen
oder

Gerät im bestehende «Application» einfügen

(Besser alle Geräte im gleichen «Application» gruppieren)

Gerät im bestehende «Application» einfügen

The screenshot shows the TTN LoRaWAN console interface. The top navigation bar includes 'Overview', 'Applications', 'Gateways', and 'Organizations'. The 'Applications' tab is active, showing the 'Demo Workshop PRIG' application (ID: workshop-01). The left sidebar contains navigation options like 'End devices', 'Live data', 'Payload formatters', 'Integrations', 'Collaborators', 'API keys', and 'General settings'. The main content area displays 'General information' for the application, including its ID, creation time, and last update. Below this, there is a 'Live data' section showing recent messages. At the bottom, a table lists the end devices under the application, with columns for ID, Name, DevEUI, JoinEUI, and Last activity. A red box highlights the '+ Add end device' button, with the text 'Neues Gerät eingeben' and a red arrow pointing to it.

Neues Gerät eingeben

ID	Name	DevEUI	JoinEUI	Last activity
prig-dragino-lt2222		A0 40 41 B4 F1 82 F1...	A2 00 00 00 00 00 01...	6 min. ago

Teil 4

Gateway registrieren

“The Things Network” (TTN)

Gateway Beispiel



Wichtig
nur Multichannel
(8 Kanäle)
verwenden

Preis (Nov. 2021):
159.- CHF [bastelgarage.ch](https://www.bastelgarage.ch)
148 - 164 CHF AliExpress

Indoor Gateway

LPS8 Indoor Multichannel LoRaWAN Gateway.

Anschluss SMA für externe Antenne.

GSM Antennen 880-960 MHz kann man teilweise auch für LoRa 868 MHz verwenden.

Stromverbrauch

Speisung: 5V, 2A (USB-C)

Gemessen auf 230V: 5.5-6.4 Watts

ca. 50 kWh / Jahr

ca. CHF 11.- / Jahr je nach Strompreis.

Anmelden zum lokalen Gateway



Login über LAN (Kabel):
<http://192.168.xx.xx:8000>

Hinweis:

http:// (nicht https)
Port: :8000

Default:

User Name: root

Password: dragino

Login auch möglich über WLAN:

<http://192.168.xx.xx/> ← ohne Port 8000

Bei mir WLAN deaktiviert. WLAN hat APRS Empfang gestört.

Benutzeroberfläche

LoRaWAN
auswählen



DRAGINO LoRa LoRaWAN MQTT TCP Custom Network System LogRead Home Logout AUTO REFRESH

System Overview

Internet

IoT Service

LoRaWAN

Model LPS8

LoRa

WiFi Access Point

WiFi AP

WLAN deaktiviert.
WLAN hat APRS Empfang gestört.

Firmware: lgw-5.4.1618196981 Hostname: dragino-20467c IoT Service: lorawan System time: Sat Jan 8 10:30:53 UTC 2022 Uptime: 1:19

Konfiguration



DRAGINO LoRa ▾ LoRaWAN ▾ MQTT ▾ TCP ▾ Custom Network ▾

LoRaWAN Configuration

General Settings

Email

Gateway ID

Primary LoRaWAN Server

Service Provider

Uplink Port

Downlink Port

Server Address

Packet Filter

Fport Filter ?

DevAddr Filter ?

Current Mode: **LoRaWAN Semtech UDP**

Gateway ID (Gateway EUI bei TTN)
= MAC Adresse + 4150
Notieren / kopieren

The Things Network V3 auswählen
Falls nicht Verfügbar: Firmware updaten oder
Custom / Private LoRaWAN auswählen
(The Things Network V2 ist nicht mehr in Betrieb)

eu1.cloud.thethings.network

Save&Apply

Console Overview



THE THINGS STACK
Community Edition

Overview

Applications

Gateways

Organizations

EU1 Community
No SLA applicable

PRIG

PRIG Digitale Betriebsarten



Welcome to the Console!

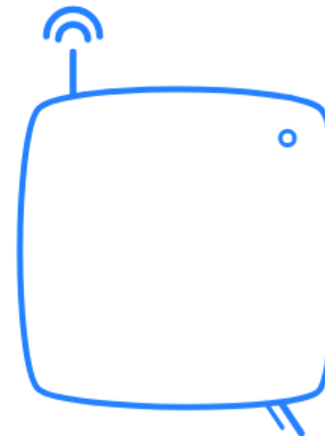
Get started right away by creating an application or registering a gateway.

Need help? Have a look at our [Documentation](#) or [Get support](#).

**Gateway
registrieren**



Create an application



Register a gateway

Neue Gateway registrieren



THE THINGS NETWORK THE THINGS STACK Community Edition Overview Applications Gateways Organizations EU1 Community No SLA applicable PRIG PRIG Digitale Betriebsarten

Gateways (1) Search by ID Claim gateway + Add gateway

ID	Name	Gateway EUI	Status
prig-gw-ahornalp	Demo Gateway PRIG Ahornalp	A8 40 41 20 46 7C 41 52	Connected

Add gateway klicken

Gateway registrieren



General settings

Owner *

Gateway ID ⓘ *

Gateway EUI ⓘ

Gateway name ⓘ

Gateway description ⓘ

Optional:
Dragino LPS-8 Gateway installiert auf dem Ahornalp

Optional gateway description; can also be used to save notes about the gateway

Gateway Server address

The address of the Gateway Server to connect to

Owner:

Konto Name «prig-01»

Gateway ID:

Name darf nur 1x existieren

Nur Kleinbuchstaben

Kein Leerschlag

Gateway EUI:

Gateway ID kopiert vom Gerät

Gateway Name:

Lesbarer Name

Nach unten scrollen...

Frequency plan ⓘ *

Übersicht, weitere Einstellungen

THE THINGS NETWORK THE THINGS STACK Community Edition

Overview Applications Gateways Organizations

EU1 Community Fair use policy applies

THE THINGS NETWORK

Gateways > Demo Gateway PRIG Ahornalp

Demo Gateway PRIG Ahornalp
ID: prig-gw-ahornalp

↑ 212 ↓ 3 • Last activity 25 seconds ago ⓘ

1 Collaborator 0 API keys

General information

Gateway ID prig-gw-ahornalp

Gateway EUI A8 40 41 20 46 7C 41 52

Gateway description Optional: Dragino LPS-8 Gateway installiert auf dem Ahornalp

Created at Jan 8, 2022 12:17:14

Last updated at Jan 8, 2022 12:17:14

Gateway Server address eu1.cloud.thethings.network

LoRaWAN information

Frequency plan EU_863_870_TTN

Live data See all activity →

- 14:04:22 Receive gateway status Metrics: { ackr: 100, rxfr
- ↑ 14:04:19 Receive uplink message DevAddr: 26 0B D8 B6 FCr
- ↑ 14:03:58 Receive uplink message DevAddr: 08 50 39 FC FCr
- 14:03:52 Receive gateway status Metrics: { ackr: 100, rxfr
- ↑ 14:03:51 Receive uplink message DevAddr: 26 0B 3B D7 FCr
- 14:03:22 Receive gateway status Metrics: { ackr: 100, rxfr

Location Change location settings →

Standort eingeben Koordinaten

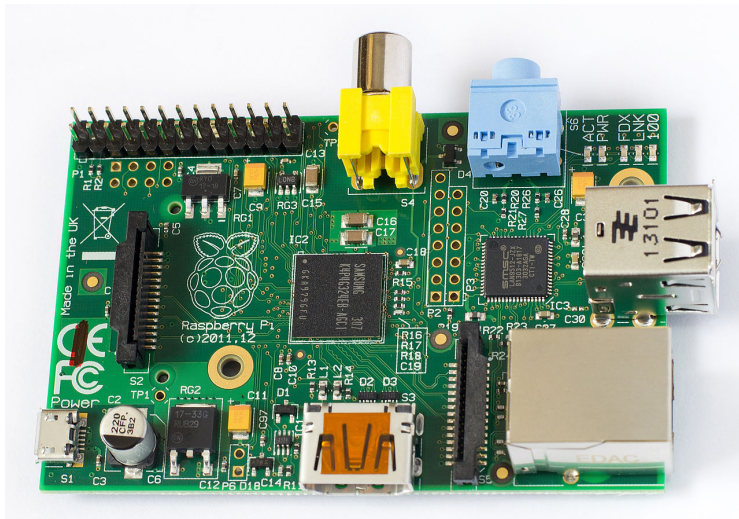
Teil 5

Raspberry Pi

Node-Red installieren

Hardware

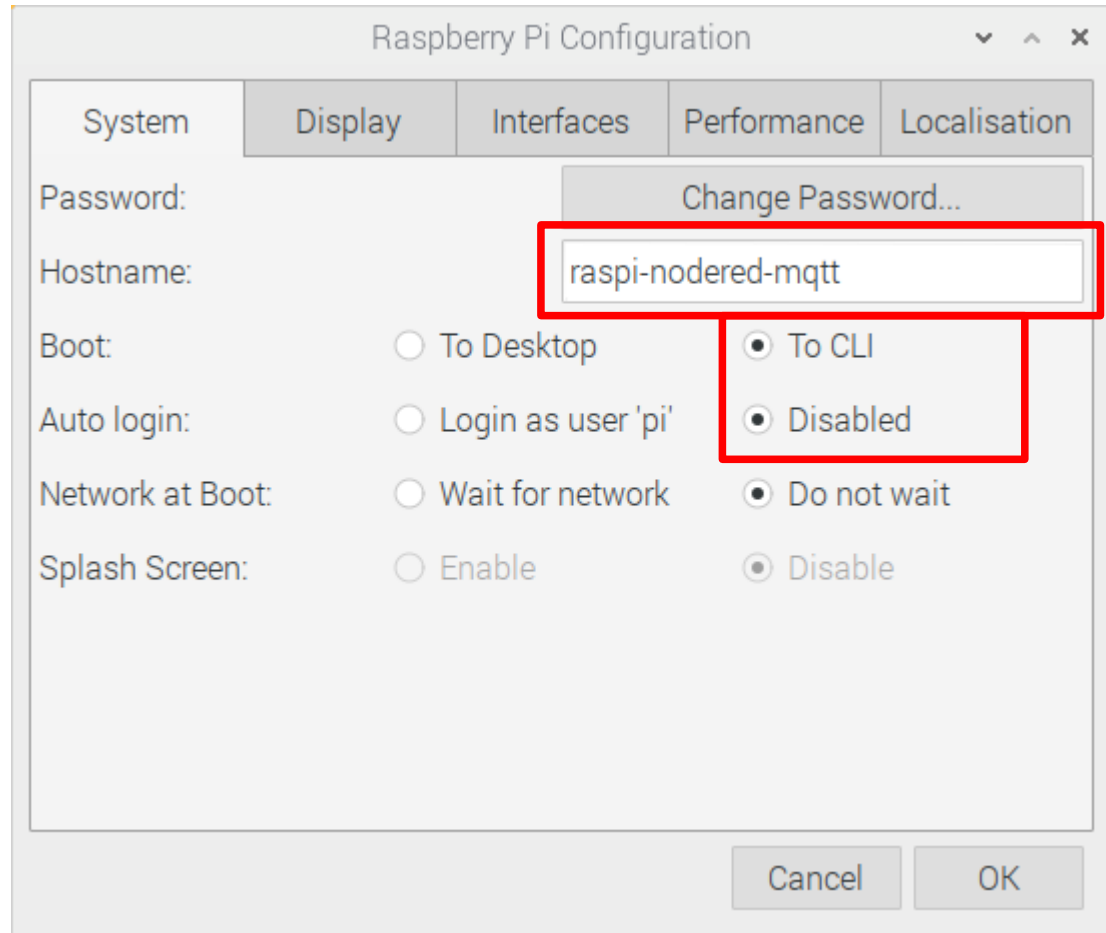
- Demo mit RaspberryPi 1 Model B
RAM: 512 MB RAM, SD Card 8 GB



- Empfohlen RaspberryPi 3 Model B oder höher

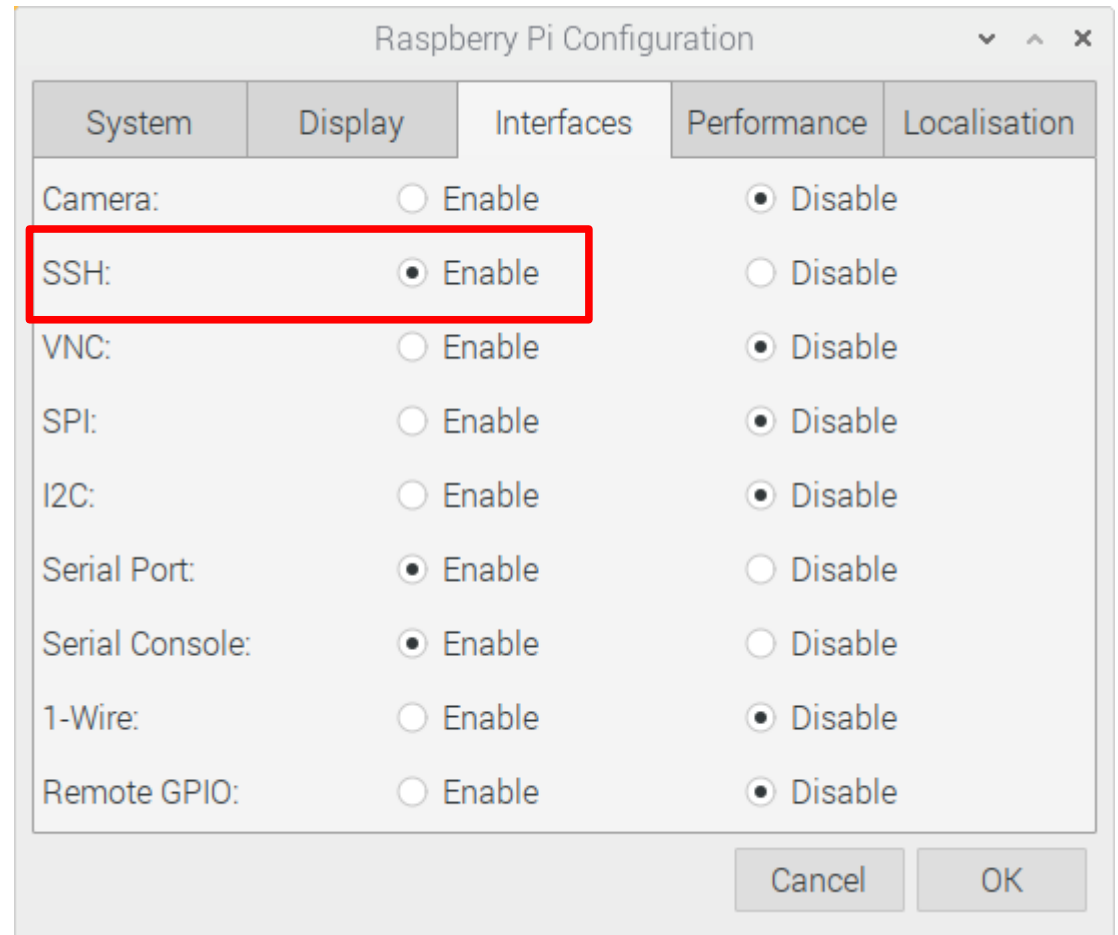
Konfiguration

- Hostname definieren
- GUI (Desktop) deaktivieren (optional)
- Auto login deaktivieren



Remote Access aktivieren

- SSH aktivieren



Remote Verbindung mit Putty

Hostname oder IP-Address

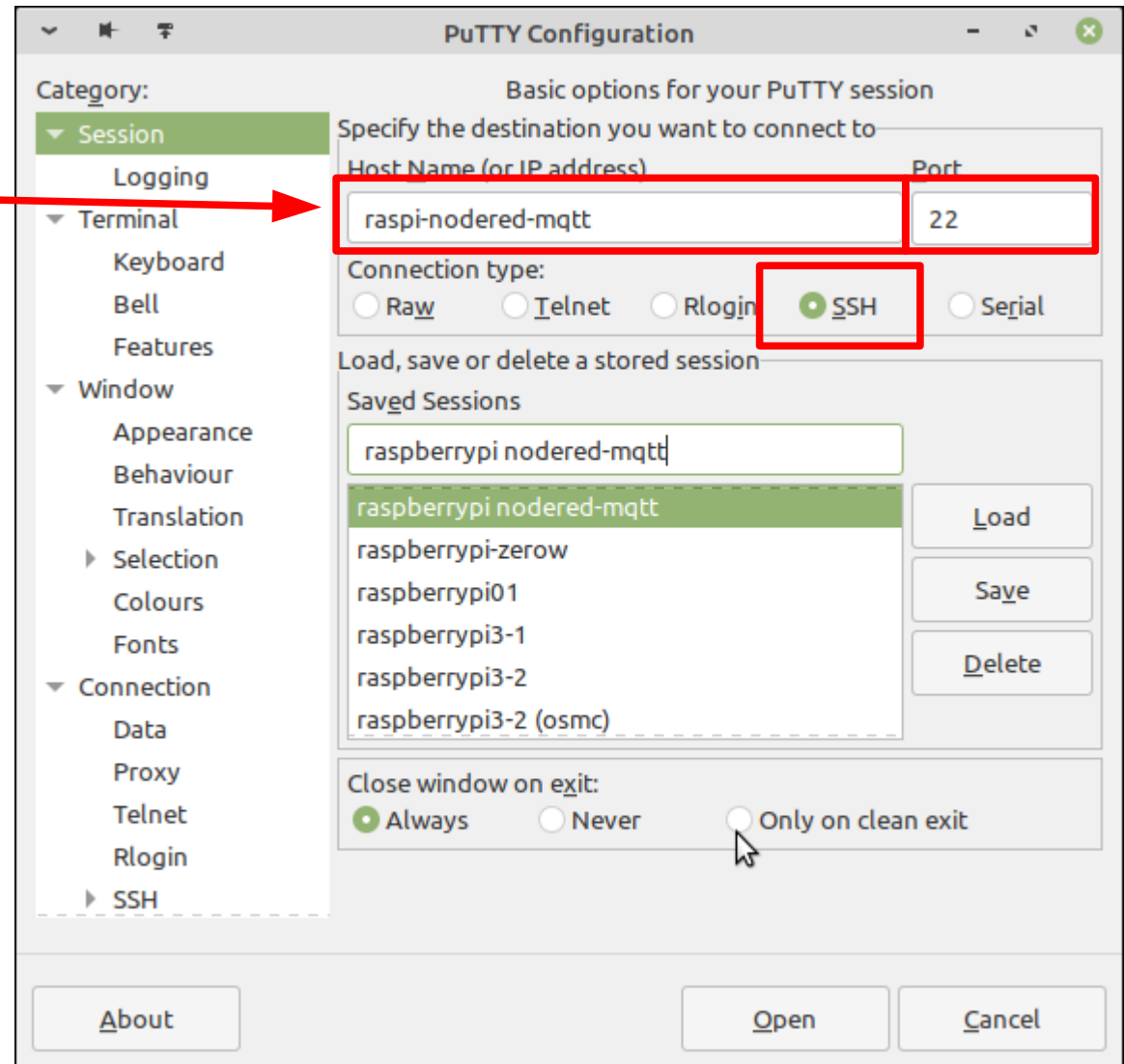
Beispiel :

raspi-nodered-mqtt

oder

192.168.xxx.xxx

- Windows :
mit Putty
- Linux :
Kommandozeile
- Mac :
mit «Terminal»



Remote Verbindung mit Terminal

- Befehl:
ssh pi@raspi-nodered-mqtt
oder
ssh pi@192.168.xxx.xxx

```
jf@Linux-PC-24:~$ ssh pi@raspi-nodered-mqtt
The authenticity of host 'raspi-nodered-mqtt (192.168.55.172)' can't be established.
ECDSA key fingerprint is SHA256:J0StGn0TVGe0T1N08cg9eo6dGbTGldy8N9prEq5JVaa.
Are you sure you want to continue connecting (yes/no/[fingerprint])? yes
Warning: Permanently added 'raspi-nodered-mqtt' (ECDSA) to the list of known hosts.
pi@raspi-nodered-mqtt's password:
Linux raspi-nodered-mqtt 5.10.63+ #1488 Thu Nov 18 16:14:04 GMT 2021 armv6l

The programs included with the Debian GNU/Linux system are free software;
the exact distribution terms for each program are described in the
individual files in /usr/share/doc/*/copyright.

Debian GNU/Linux comes with ABSOLUTELY NO WARRANTY, to the extent
permitted by applicable law.
Last login: Sun Dec  5 11:43:08 2021 from 192.168.55.24
pi@raspi-nodered-mqtt:~ $
```

yes
Passwort eingeben

Node-Red installieren

Link: <https://nodered.org/docs/getting-started/raspberrypi>

- **Terminal:**

```
bash <(curl -sL  
https://raw.githubusercontent.com/node-red/linux-installers/master/deb/  
update-nodejs-and-nodered)
```

```
pi@raspi-nodered-mqtt:~ $ bash <(curl -sL https://raw.githubusercontent.com/node-red/linux-installers/master/deb/update-nodejs-and-nodered)
```

```
This script checks the version of node.js installed is 12 or greater. It will try to  
install node 14 if none is found. It can optionally install node 12, 14 or 16 LTS for you.
```

```
If necessary it will then remove the old core of Node-RED, before then installing the latest  
version. You can also optionally specify the version required.
```

```
It also tries to run 'npm rebuild' to refresh any extra nodes you have installed  
that may have a native binary component. While this normally works ok, you need  
to check that it succeeds for your combination of installed nodes.
```

```
To do all this it runs commands as root - please satisfy yourself that this will  
not damage your Pi, or otherwise compromise your configuration.  
If in doubt please backup your SD card first.
```

```
See the optional parameters by re-running this command with --help
```

```
Are you really sure you want to do this ? [y/N] ? y
```

```
Would you like to install the Pi-specific nodes ? [y/N] ? 
```

- **20-30 Minuten warten...**

Installation Node-Red beenddet

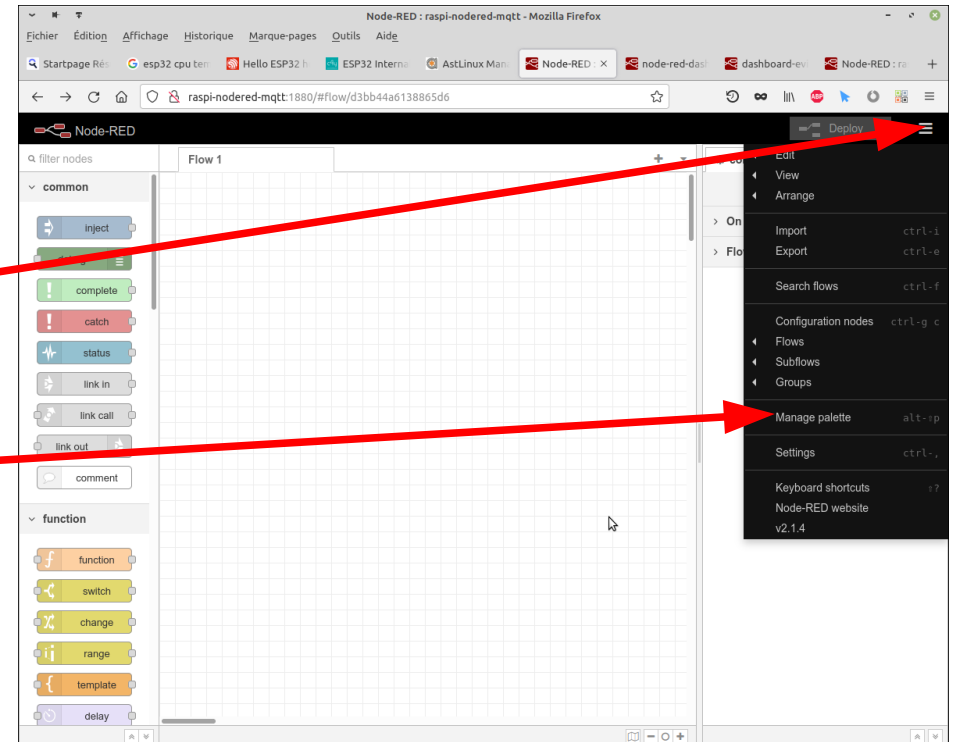
```
pi@raspi-nodered-mqtt: ~  
Running Node-RED install for user pi at /home/pi on raspbian  
  
This can take 20-30 minutes on the slower Pi versions - please wait.  
  
Stop Node-RED ✓  
Remove old version of Node-RED ✓  
Remove old version of Node.js ✓  
Install Node.js for Armv6 ✓ v14.18.1 Npm 6.14.15  
Clean npm cache ✓  
Install Node-RED core ✓ 2.1.4  
Move global nodes to local -  
Npm rebuild existing nodes ✓  
Install extra Pi nodes ✓  
Add shortcut commands ✓  
Update systemd script ✓  
  
Any errors will be logged to /var/log/nodered-install.log  
All done.  
You can now start Node-RED with the command node-red-start  
or using the icon under Menu / Programming / Node-RED  
Then point your browser to localhost:1880 or http://{your_pi_ip-address}:1880  
  
Started : Sun 05 Dec 2021 12:29:51 PM CET  
Finished: Sun 05 Dec 2021 12:52:59 PM CET  
  
You may want to run node-red admin init  
to configure your initial options and settings.  
  
pi@raspi-nodered-mqtt:~ $
```

Node-Red Befehle

- Node-Red starten:
node-red-start
- Link in Internet Browser öffnen (z.B. Firefox):
`http://raspi-nodered-mqtt:1880`
`http://{your_pi_ip-address}:1880`
- Node-Red automatisch starten:
sudo systemctl enable nodered.service

Node-Red Dashboard installieren

- Link in Internet Browser öffnen (z.B. Firefox):
<http://raspi-nodered-mqtt:1880>
- Menu öffnen
- Manage Palette wählen



Node-Red Dashboard installieren

The screenshot shows the 'User Settings' dialog box in Node-Red. The 'View' tab is set to 'Install'. The search bar in the 'Palette' section contains the text 'dashboard'. Below the search bar, three search results are listed:

- dashboard-evi**: A set of dashboard nodes for Node-RED. Version 1.0.2, updated 2 months ago. An 'install' button is visible.
- cn-dashboard-nodes**: A set of dashboard nodes for Node-RED. Version 0.0.2, updated 3 years, 5 months ago. An 'install' button is visible.
- node-red-dashboard**: A set of dashboard nodes for Node-RED. Version 3.1.2, updated 2 weeks ago. An 'install' button is visible.

Install wählen

dashboard suchen

node-red-dashboard
installieren

Node-Red empfohlene Module

- Node-red-contrib-moment
(Datum/Zeit formatieren / anzeigen)

Teil 6

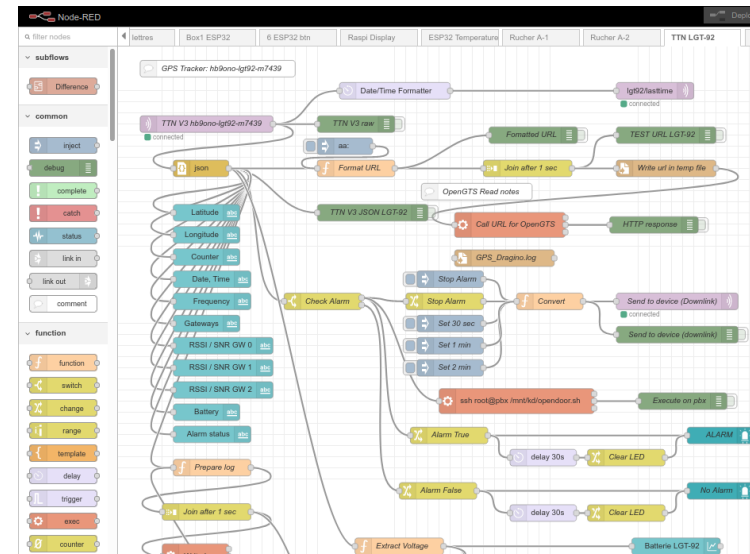
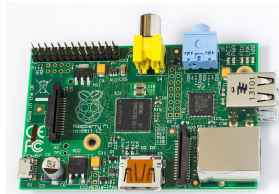
Node-Red & MQTT

Node-Red

Konfiguration:

<http://raspi-nodered-mqtt:1880/>

<http://raspberrypi3-1:1880/ui/>



Dashboard:

(Armaturenbrett / Anzeigetafel)

<http://raspi-nodered-mqtt:1880/ui/>

<http://raspberrypi3-1:1880/ui/>



TTN (b)			
Dragino LT22222-L			
Voltage 1	3.376 VDC	Voltage 2	11.93 VDC
Current 1	0.009 mA	Current 2	0.017 mA
Digital Input 1	H	Digital Input 2	L
Relais 1	ON	Relais 1	<input checked="" type="checkbox"/>
Relais 2	OFF	Relais 2	<input type="checkbox"/>
Digital Output 1	H	Output 1	<input type="checkbox"/>
Digital Output 2	H	Output 2	<input type="checkbox"/>
Date, Time 2021-12-31 11:04:04			
Counter 25			
Frequency 868100 kHz			
Gateways 8			
RSSI / SNR GW 0 -124 dBm / -4.8 dB			
RSSI / SNR GW 1 -57 dBm / 10.2 dB			
RSSI / SNR GW 2 -111 dBm / 3.8 dB			
RSSI / SNR GW 3 -33 dBm / 3.8 dB			
Gateways Names packetbroker, hb9ono-gw-1-port, bhbiel-hoehenweg, hb9ono-gw-2-lyss, packetbroker, iot-gw-rk-02-16, iot-gw-sc-c01, iot-gw-sc-c02, ,			
<input type="button" value="ACTUALISE"/>			

MQTT Server bei TTN

The screenshot shows the TTN (The Things Network) web interface. At the top, there's a navigation bar with 'Overview', 'Applications' (selected), 'Gateways', and 'Organizations'. Below this, the breadcrumb path is 'Applications > Demo Workshop PRIG > MQTT'. The main content area is titled 'MQTT' and contains a paragraph explaining that the Application Server exposes an MQTT server for streaming events, requiring an API key as a connection password. Below the text is a 'Connection credentials' section with four fields: 'Public address' (eu1.cloud.thethings.network:1883), 'Public TLS address' (eu1.cloud.thethings.network:8883), 'Username' (workshop-01@ttn), and 'Password' (with a 'Generate new API key' button and a 'Go to API keys' link). A red box highlights the 'Public TLS address', 'Username', and 'Password' fields. Red arrows point from these fields to labels on the right: 'Server' for the TLS address, 'Username' for the username, and 'API Key = Password' for the password. A red arrow also points to the 'MQTT' option in the left sidebar.

THE THINGS NETWORK

THE THINGS STACK
Community Edition

Overview Applications Gateways Organizations

Applications > Demo Workshop PRIG > MQTT

MQTT

The Application Server exposes an MQTT server to work with streaming events. In order to use the MQTT server you need to create a new API key, which will function as connection password. You can also use an existing API key, as long as it has the necessary rights granted. Use the connection information below to connect.

Connection credentials

Public address	eu1.cloud.thethings.network:1883
Public TLS address	eu1.cloud.thethings.network:8883
Username	workshop-01@ttn
Password	Generate new API key Go to API keys

MQTT

Server

Username

API Key = Password

Node-Red MQTT Login



**Wichtig: API Key (MQTT Password) lokal abspeichern.
Kann nicht mehr im TTN Console gelesen werden.**

Login Daten:

Server: eu1.cloud.thethings.network

Port: 8883 (1883 = insecure)

Username: workshop-01@ttn

Password: API Key

API Key (MQTT Password)
in der Zwischenablage
kopieren

Public TLS address	<input type="text" value="eu1.cloud.thethings.network:8883"/>
Username	<input type="text" value="workshop-01@ttn"/>
Password	<input type="password" value="....."/>

Topic: v3/Username/devices/DeviceID/up

Beispiel:

v3/workshop-01@ttn/devices/prig-dragino-lt22222/up

Node-Red Daten von TTN abholen



Node «mqtt in» einfügen und konfigurieren

The screenshot shows the Node-RED interface with the 'mqtt in' node selected. The configuration panel for the 'mqtt in' node is open, showing the following fields:

- Server:** PRIG-01 (highlighted with a red box and labeled "Server erstellen")
- Topic:** v3/workshop-01@ttn/devices/prig-dragino-lt22222 (labeled "Username")
- QoS:** 2
- Output:** auto-detect (string or buffer)
- Name:** Dragino LT-22222 (labeled "Name (optional)")

The Things Stack supports the MQTT Standard Version 3.1.1 and QoS 0 only.

Node-Red Login to MQTT Server



Edit mqtt in node > Edit mqtt-broker node

Delete Cancel Update

Properties

Name PRIG-01

Connection Security Messages

Server eu1.cloud.thethings.network Port 8883

Enable secure (SSL/TLS) connection

TLS Configuration TLS configuration

Client ID Leave blank for auto generated

Keep alive time (s) 60 Use clean session

Use legacy MQTT 3.1 support

Name
Beispiel PRIG-01

Server / Port

Security klicken
Username / Password eingeben

Password:
API Key

Name PRIG-01

Connection Security

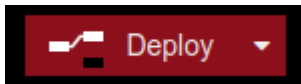
Username workshop-01@ttn

Password

MQTT Daten in Debug lesen



«Debug» einfügen und verbinden.
Deploy klicken



The screenshot shows the Node-RED web interface. At the top, there's a black header with the Node-RED logo and a 'Deploy' button. Below the header, there's a search bar and a breadcrumb trail showing 'ESP32 Monitoring' and 'Flow 2'. The main workspace is a grid where two nodes are connected: a purple 'Dragino LT-22222' node and a green 'msg.payload' node. On the left, a sidebar shows the 'common' category with nodes like 'inject', 'debug', 'complete', and 'catch'. On the right, a sidebar shows the configuration for the 'debug' node. A red arrow points from the text 'Deploy klicken' to the 'Deploy' button in the top right corner of the Node-RED interface.

MQTT Daten von TTN

The screenshot shows the Node-RED interface with a flow named 'Flow 2' under the 'ESP32 Monitoring' workspace. The flow consists of three nodes: a purple 'Dragino LT-22222' node with a 'connected' indicator, a green 'msg.payload' node, and a green 'debug' node. A red arrow points from the 'connected' indicator to the text '«connected» = Verbindung zu TTN Server OK'. Another red arrow points from the 'msg.payload' node to the 'debug' node. The 'debug' node displays the following MQTT data:

```
31.12.2021, 13:19:16 node: 970899c9.402728
v3/workshop-01@ttn/devices/prig-dragino-lt22222/up : msg.payload :
string[6322]
{"end_device_ids":{"device_id":"prig-
dragino-lt22222","application_ids":
{"application_id":"workshop-
01"},"dev_eui":"A04041B4F182F1AA","join_eui"
["as:up:01FR86W4KD6DT3YTX554JN4ZHJ","gs:conn
/HandleUplink:01FR86W4CRFHCKBJ4ACMHY98N0","r
/ttn.lorawan.v3.NsAs
/HandleUplink:01FR86W4KCQJ5PDXF7VCKV3A8B"]},
{"session_key_id":"AX4Mg0eeN8uXN5mnU32iow=="
/0E=","decoded_payload":
{"ACI1_mA":0.009,"ACI2_mA":0.017,"AVI1_V":3.
[{"gateway_ids":{"gateway_id":"hb9ono-
gw-1-port"},"eui..."
```

«connected» =
Verbindung zu TTN Server OK

MQTT Daten

MQTT Daten anzeigen

Layout klicken

Tab einfügen

Group einfügen

The screenshot shows the Node-RED dashboard configuration interface. A red box highlights the 'Layout' icon in the top navigation bar. A red arrow points to the '+ tab' button in the 'Tabs & Links' section. Another red arrow points to the 'Group 1' entry in the 'Tabs & Links' list.

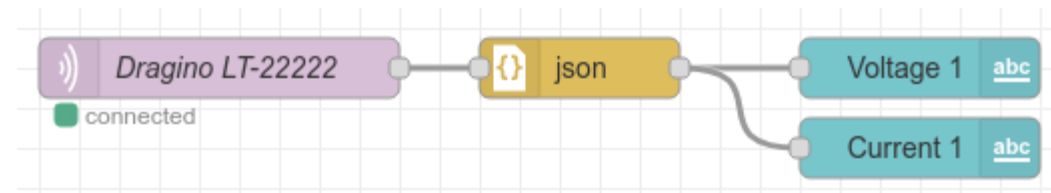
Tab & Group umbenennen (optional)

The close-up shows the 'Tabs & Links' section with three entries: 'Temperature charts', 'Temperaturen', and 'TTN'. The 'TTN' entry is expanded to show a sub-group 'Sensor A'. A red box highlights the 'TTN' and 'Sensor A' entries.

Json parser einfügen



Ausgabe einfügen



Value Format:

Voltage 1:

`{{payload.uplink_message.decoded_payload.AVI1_V}}` VDC

Current 1:

`{{payload.uplink_message.decoded_payload.ACI1_mA}}` mA



Links The Things Network

Gateways Map

<https://www.thethingsnetwork.org/map>

<https://ttnmapper.org/>

Spreading Factors

<https://www.thethingsnetwork.org/docs/lorawan/spreading-factors/>

Regional Parameters

<https://www.thethingsnetwork.org/docs/lorawan/regional-parameters/>

Modulation & Data Rate

<https://www.thethingsnetwork.org/docs/lorawan/modulation-data-rate/>

LoRaWAN airtime calculator

<https://www.thethingsnetwork.org/airtime-calculator>

USKA Hamgroups

IoT Internet of Things (LoRa LoRaWAN)

Erfahrungs-Austausch unter Hams, die sich mit LoRa, LoRaWAN und IoT (“Industrie 4.0”) beschäftigen.

<https://www.hamgroups.ch/lora-lorawan-iot/>

Moderator: Andreas Spiess HB9BLA

“the guy with the Swiss accent”

Links

<https://www.lora-wan.de/>

https://de.wikipedia.org/wiki/Long_Range_Wide_Area_Network

<https://www.schmidiger.ch/blog/lora-funktechnologie-wie-gut-ist-sie-wirklich>

<https://www.hackster.io/nootropicdesign/using-lorawan-end-devices-on-the-thing-s-network-206a86>

LoRa Video Andreas Spiess (HB9BLA)

<https://www.youtube.com/watch?v=hMOwbNUpDQA>

Youtube Channels Andreas Spiess (HB9BLA)

<https://www.youtube.com/AndreasSpiess>

<https://www.youtube.com/c/HB9BLAWireless>

Geräte gekauft bei:

<https://www.bastelgarage.ch/>

Ende

- Fragen ?
- Danke für Ihre Aufmerksamkeit