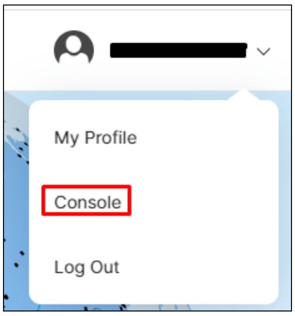
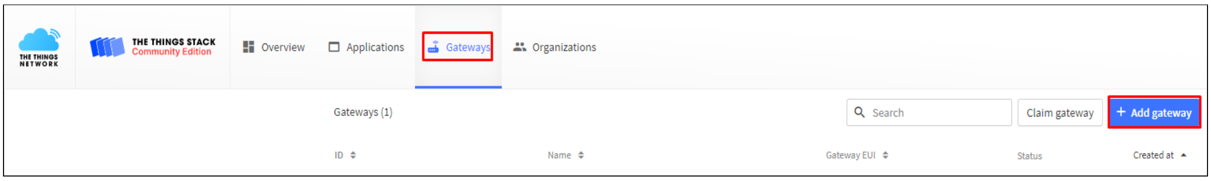
Gateway Registration

1. Access your The Things Network account, click on your user ID on the top right and access the console.



[redacted]

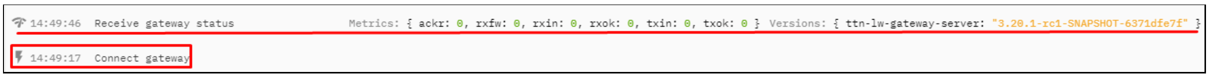
2. Select your cluster of preference (eg. North America cluster (nam1)).
3. Access gateways screen and click on “add gateway”, make a unique ID and a name for your gateway, then paste the gateway ID from step 2 into the “Gateway EUI” field. Select your area’s frequency plan (eg. AU915-928 FSB2).



Gateways (1)

ID	Name	Gateway EUI	Status	Created at

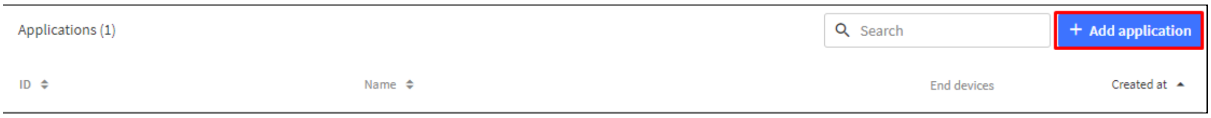
4. Confirm the gateway creation.
5. If your gateway device hasn’t been configured in accordance with your FSB, you may access your gateway’s page and download a configuration file by clicking on “download global_conf.json”.
6. Activate your gateway device and check the TTN’s gateway live data tab to see if the gateway communicates with the network.



```
14:49:46  Receive gateway status          Metrics: { ackr: 0, rxfw: 0, rxin: 0, rxok: 0, txin: 0, txok: 0 }  Versions: { ttn-lw-gateway-server: "3.20.1-rc1-SNAPSHOT-6371dfe7f" }
14:49:17  Connect gateway
```

Application Registration

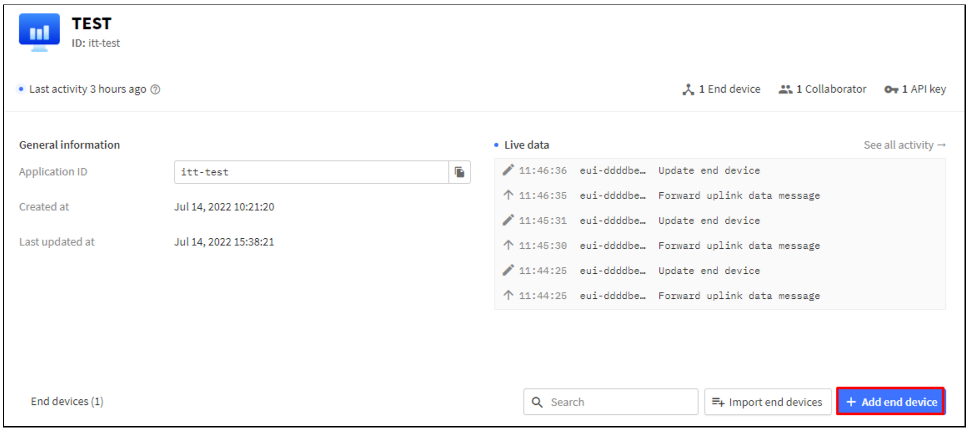
1. Access the TTN console, open the Applications tab and click on “Add Application”.



2. Create a name and ID for your application (the ID must be unique).

End Node Registration

1. Access your application’s page and click on “Add End Device”, then select your device from the list. If your device is not listed in the TTN’s device repository, you may manually insert its specifications in the “Manually” tab (to find what these specifications are, you must verify your device’s datasheet/user guide). Ex: select the US902-928 FSB2 frequency plan, select the LoRaWAN version 1.0.2, select the RP001 Regional Parameters 1.0.2 revision B regional parameter version.



General information

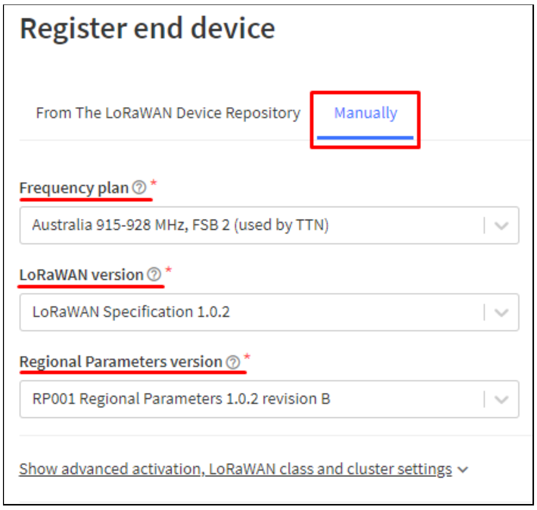
Application ID: itt-test

Created at: Jul 14, 2022 10:21:20

Last updated at: Jul 14, 2022 15:38:21

Live data — See all activity →

```
11:46:36  eui-ddddbe…  Update end device
11:46:35  eui-ddddbe…  Forward uplink data message
11:45:31  eui-ddddbe…  Update end device
11:45:30  eui-ddddbe…  Forward uplink data message
11:44:25  eui-ddddbe…  Update end device
11:44:25  eui-ddddbe…  Forward uplink data message
```

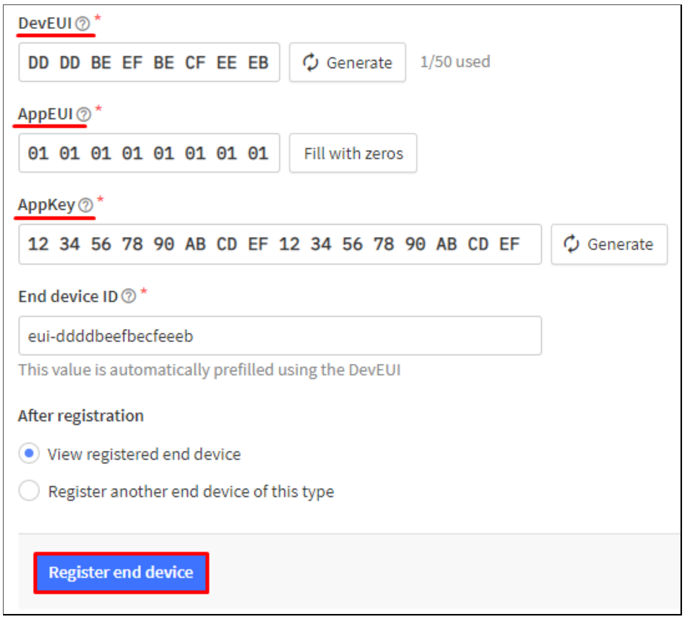

Register end device
From The LoRaWAN Device Repository
Manually
Show advanced activation, LoRaWAN class and cluster settings

Frequency plan *: Australia 915-928 MHz, FSB 2 (used by TTN)

LoRaWAN version *: LoRaWAN Specification 1.0.2

Regional Parameters version *: RP001 Regional Parameters 1.0.2 revision B

2. Insert in the DevEUI field the device key (LORAWAN_DEVICE_EUI), do the same with the AppEUI (LORAWAN_JOIN_EUI) and AppKey (as per the example, since we are using LoRaWAN version 1.0.2, then we will insert LORAWAN_NWK_KEY) fields.



DevEUI ⓘ *
DD DD BE EF BE CF EE EB

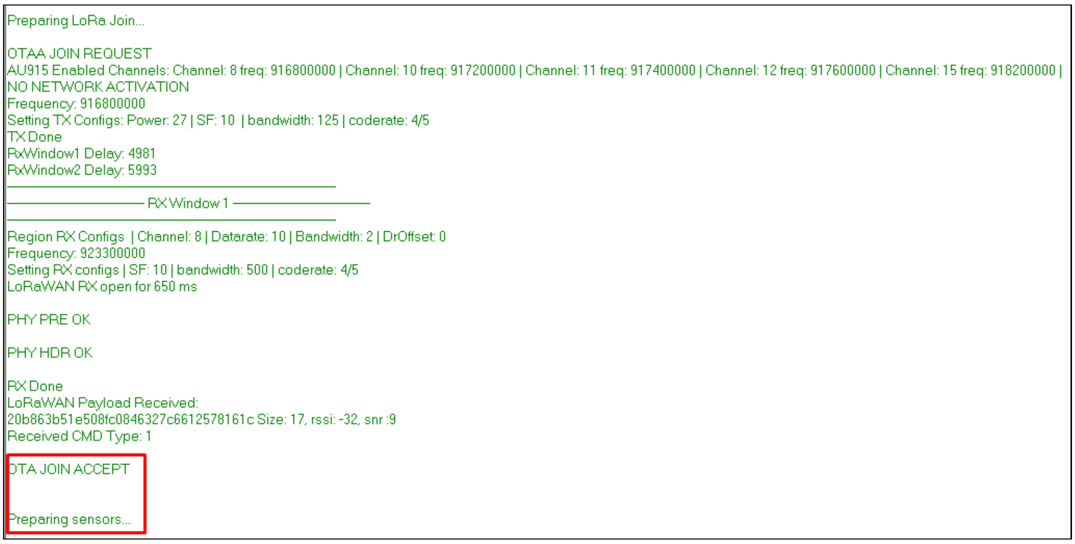
AppEUI ⓘ *
01 01 01 01 01 01 01 01

AppKey ⓘ *
12 34 56 78 90 AB CD EF 12 34 56 78 90 AB CD EF

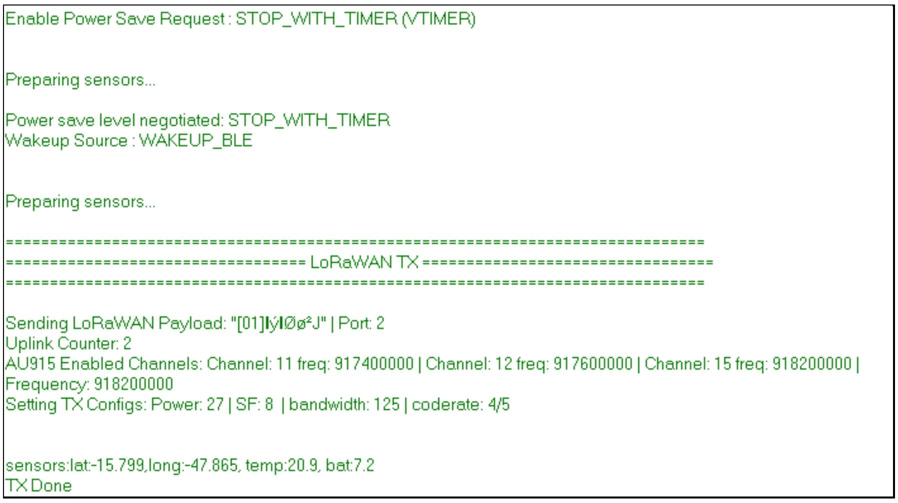
End device ID ⓘ *
eui-ddddbeefbecfeeeb
This value is automatically prefilled using the DevEUI

After registration
● View registered end device
○ Register another end device of this type

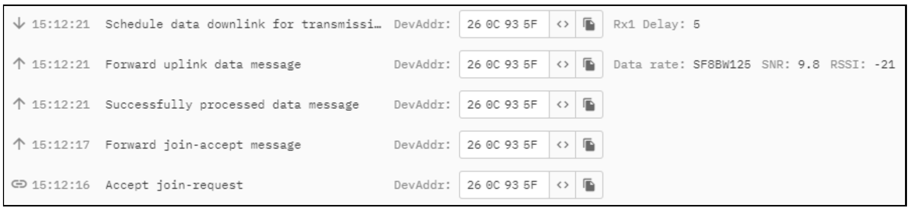
3. Connect the gateway to your computer, start the packet forwarder, connect your end node to the power supply (i.e. the USB port) and wait for it to connect to the LoRaWAN. You can monitor the serial port of the end node to check this. Once the device is connected, wait for it to send data to the TTN (device's "live data" tab).



```
Preparing LoRa Join...

OTAA JOIN REQUEST
AU915 Enabled Channels: Channel: 8 freq: 916800000 | Channel: 10 freq: 917200000 | Channel: 11 freq: 917400000 | Channel: 12 freq: 917600000 | Channel: 15 freq: 918200000 |
NO NETWORK ACTIVATION
Frequency: 916800000
Setting TX Configs: Power: 27 | SF: 10  | bandwidth: 125 | coderate: 4/5
TX Done
RxWindow1 Delay: 4981
RxWindow2 Delay: 5993
----------------------------------------------------------------
-------------------------- RX Window 1 --------------------------
----------------------------------------------------------------
Region RX Configs  | Channel: 8 | Datarate: 10 | Bandwidth: 2 | DrOffset: 0
Frequency: 923300000
Setting RX configs | SF: 10 | bandwidth: 500 | coderate: 4/5
LoRaWAN RX open for 650 ms

PHY PRE OK

PHY HDR OK

RX Done
LoRaWAN Payload Received:
20b863b51e508fc0846327c6612578161c Size: 17, rssi: -32, snr :9
Received CMD Type: 1

OTA JOIN ACCEPT


Preparing sensors...
```

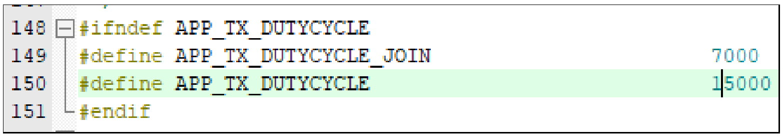


```
Enable Power Save Request : STOP_WITH_TIMER (VTIMER)


Preparing sensors...

Power save level negotiated: STOP_WITH_TIMER
Wakeup Source : WAKEUP_BLE


Preparing sensors...

==============================================================================
================================= LoRaWAN TX =================================
==============================================================================

Sending LoRaWAN Payload: "[01]IýIØø²J" | Port: 2
Uplink Counter: 2
AU915 Enabled Channels: Channel: 11 freq: 917400000 | Channel: 12 freq: 917600000 | Channel: 15 freq: 918200000 |
Frequency: 918200000
Setting TX Configs: Power: 27 | SF: 8  | bandwidth: 125 | coderate: 4/5


sensors:lat:-15.799,long:-47.865, temp:20.9, bat:7.2
TX Done
```



```
↓ 15:12:21  Schedule data downlink for transmissi…  DevAddr: 26 0C 93 5F  Rx1 Delay: 5
↑ 15:12:21  Forward uplink data message             DevAddr: 26 0C 93 5F  Data rate: SF8BW125  SNR: 9.8  RSSI: -21
↑ 15:12:21  Successfully processed data message     DevAddr: 26 0C 93 5F
↑ 15:12:17  Forward join-accept message             DevAddr: 26 0C 93 5F
  15:12:16  Accept join-request                     DevAddr: 26 0C 93 5F
```

Obs.: The 'LORAMAC_STATUS_BUSY' error is caused by an overlap in the Tx and Rx times in the end node. Adjusting the 'APP_TX_DUTYCYCLE' value (in lorawandefines.h) from 5000 (5s) to 15000 (15s), for example, should correct this.



```c
#ifndef APP_TX_DUTYCYCLE
#define APP_TX_DUTYCYCLE_JOIN                          7000
#define APP_TX_DUTYCYCLE                               15000
#endif
```