

Table of Contents

I. APPLICATION	1
II. DEVICE DESCRIPTION	1
III. TECHNICAL SPECIFICATIONS	1
IV. COMMUNICATIONS SCHEME	2
V. DEVICE CONFIGURATION IN CHIRPSTACK	2

I. APPLICATION

APRANGE is a radio relay, a Class A device used to extend the signal of IoT network with LoRaWAN 1.0.4 protocol operating at 868MHz. It helps collecting data from hard-to-reach, or distant reading points and relaying it to the LoRaWAN Gateway station. Relay is compatible with all devices that support LoRaWAN® Relay specification TS011-1.0.0 and can attach up to 15 additional devices to the network.

II. DEVICE DESCRIPTION

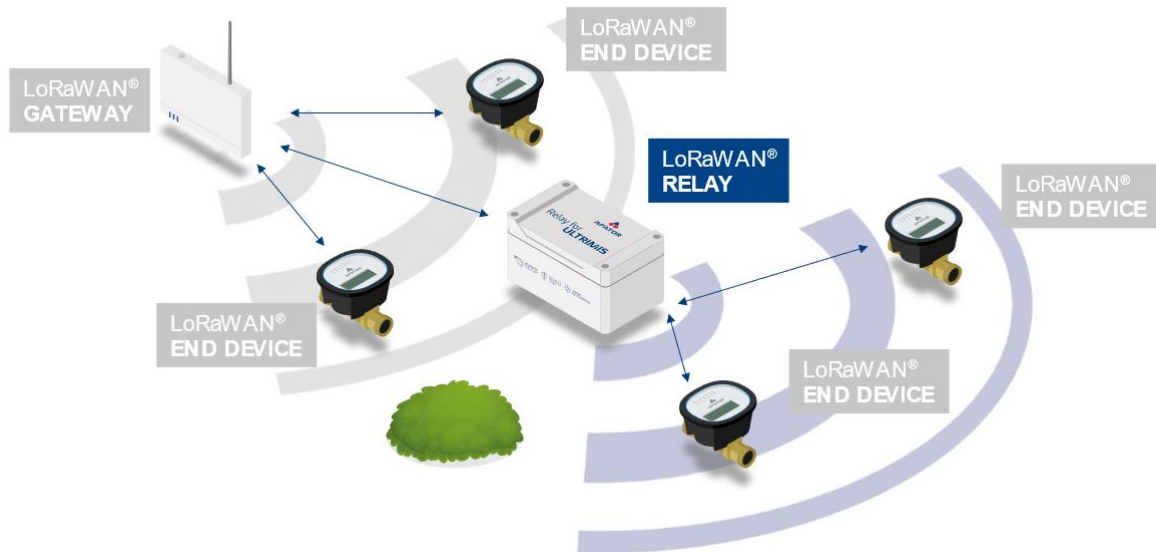
- Body** – The device is a non-separable unit with a body size of 120 x 90 x 60.5 mm providing IP68 protection.
- Mounting** – It is done by screwing directly to the walls or to various types of mounting racks, in any position.
- Power supply** – The battery is replaceable with up to 10 years of operation. Battery replacement instructions are sent with the new battery.
- Communication** – The element that provides communication in the LoRaWAN network is the radio module, which consists of electronic components and an integrated antenna, located inside the housing.
- Server** - Relay operates with Chirpstack software (from version V4.4.0).

III. TECHNICAL SPECIFICATIONS

Body dimensions	120 x 90 x 60.5 mm
Communication	LP-WAN LoRaWAN 868MHz
Communication protocol	LoRaWAN v. min. 1.0.4, TS011-1.0.0
Server	Supported by Chirpstack (V4.4.0 and above)
Device capacity	Up to 15 devices
Antenna type	Integrated
Network activation	OTAA initiated with REED switch
Protection class	IP68
Operating temperature	- 20°C to +70°C
Battery type	Replaceable, size D, 3.6V, 17Ah
Battery life	Up to 10 years

Mounting possibilities	Mounting with 4 screws: direct, on wall brackets, on pole, in any position
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IV. COMMUNICATIONS SCHEME



V. DEVICE CONFIGURATION IN CHIRPSTACK

Prerequisites:

To install a relay on an NS (network server) like ChirpStack, you will need the following information from both Relay and End device:

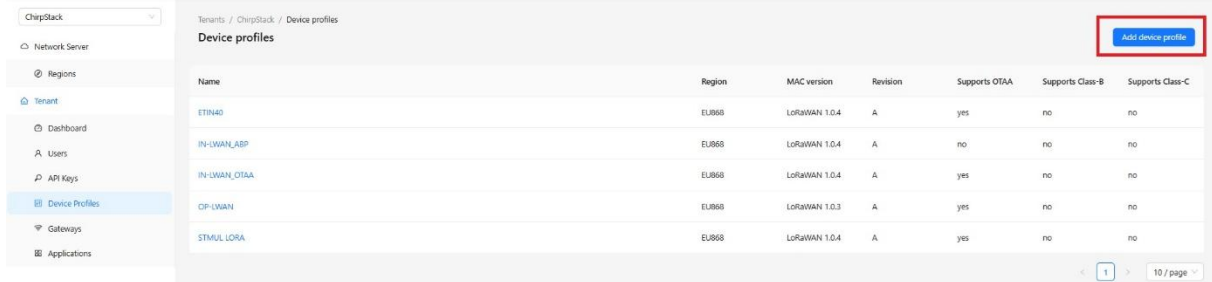
1. Application Key
2. Join Eui
3. Device Eui

These keys are necessary for installing the device/relay on ChirpStack. They should be provided by the device vendor.

Running instance of ChirpStack, version $\geq 4.4.0$

1. Device profile for Relay and end device

A new device profile must be created in “Device Profiles” tab for both the end device and Relay.



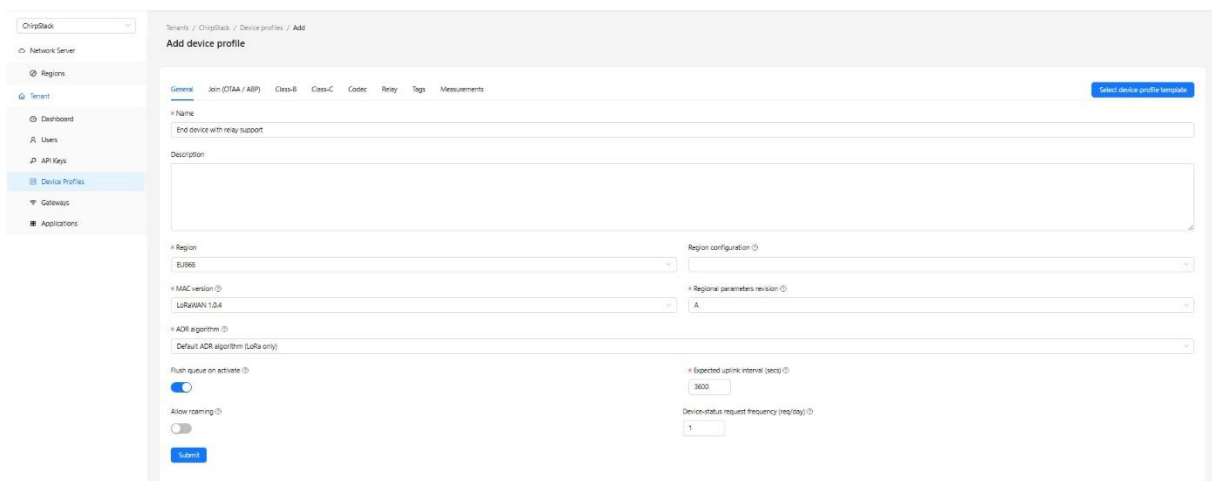
Name	Region	MAC version	Revision	Supports OTAA	Supports Class-B	Supports Class-C
ETIN4D	EU868	LoRaWAN 1.0.4	A	yes	no	no
IN-LWAN_ABP	EU868	LoRaWAN 1.0.4	A	no	no	no
IN-LWAN_OTAA	EU868	LoRaWAN 1.0.4	A	yes	no	no
OP-LWAN	EU868	LoRaWAN 1.0.3	A	yes	no	no
STMUL_LORA	EU868	LoRaWAN 1.0.4	A	yes	no	no

2. End-device profile settings

In order to set the end-device profile, you need to create a new profile as in point 1. The end-device profile should look as follows. Under “ADR algorithm”, it is possible to configure the ADR plug-in.

Ensure the following fields:

- Name: Some fitting name “End device, with relay support”
- MAC version: LoRaWAN 1.0.4
- Region: Your region parameters (EU868)
- ADR algorithm: You can freely choose which ADR algorithm you need, in this case Default ADR algorithm is chosen.



Add device profile

General | Join (OTAA / ABP) | Class-B | Class-C | Codec | Relay | Tags | Measurements

Name: End device with relay support

Description:

Region: EU868

MAC version: LoRaWAN 1.0.4

ADR algorithm: Default ADR algorithm (LoRa only)

Flush queue on activate: ☒

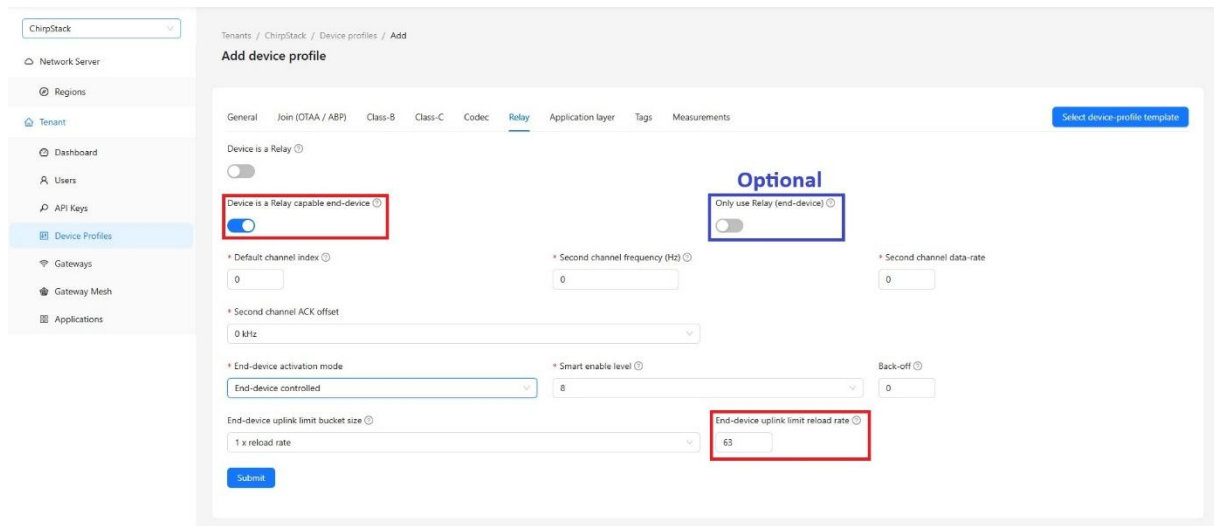
Allow roaming: ☐

Expected uplink interval (secs): 3600

Device status request frequency (req/day): 1

Save

On the Relay tab, check the “Device is a Relay capable end-device” option. There is also an option to force the end-device through the relay using the “Only use Relay (end-device)” setting. Remember to set “End-device uplink limit reload rate” to a value other than 0. The value of 63 is unlimited, so it allows forwarding of all uplinks from the end-device.



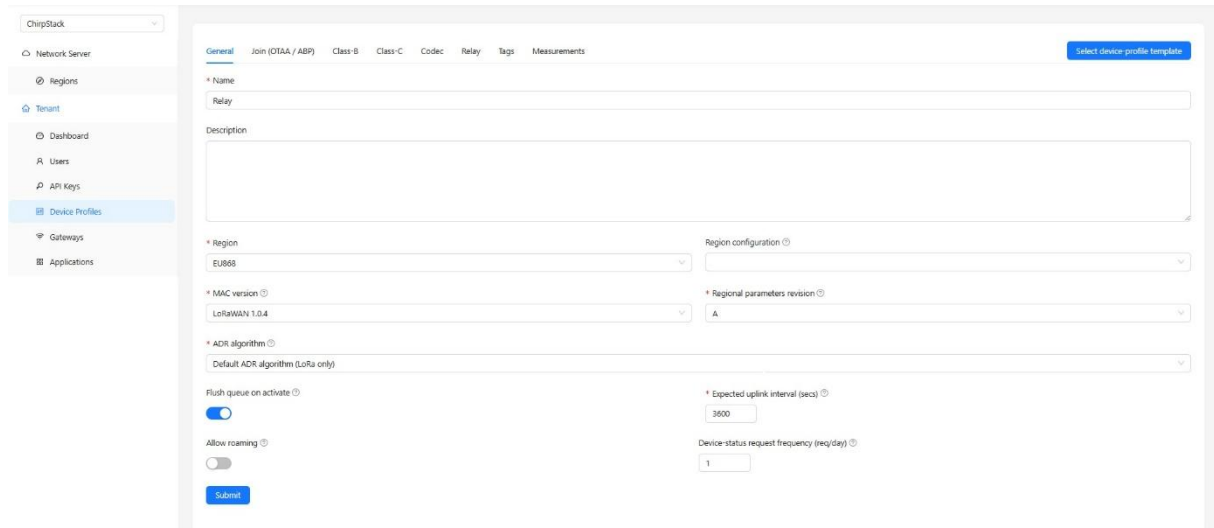
Now the profile of the end device is ready for use.

3. Relay profile settings

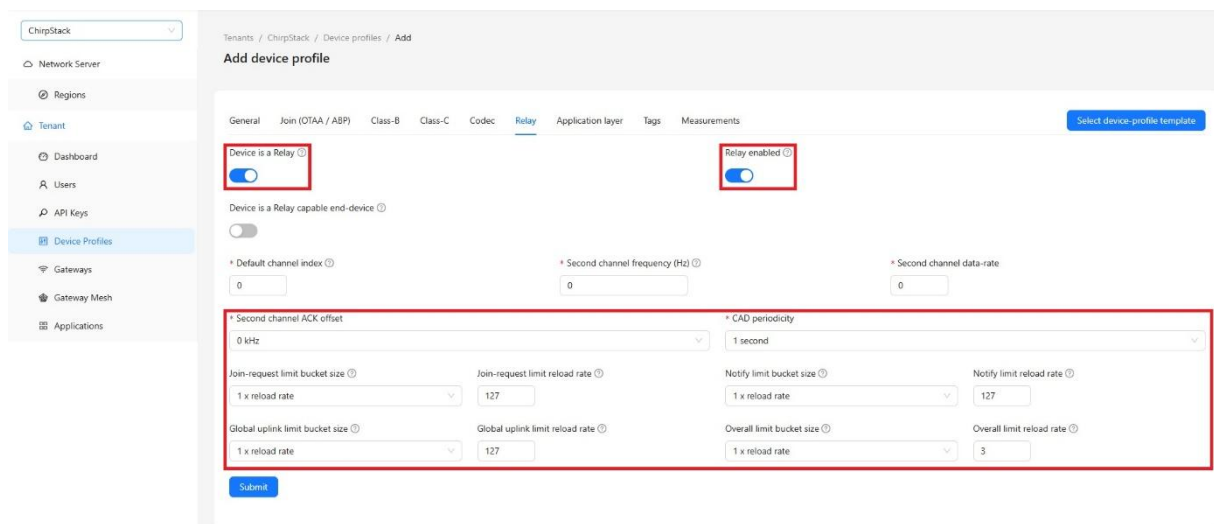
To set the Relay profile, create a new profile as in point 1. The first page is the same for Relay settings as for the end device. The only choice is to select the ADR plug-in.

Your Relay device profile should look like this:

- Name: Some fitting name “Relay”
- MAC version: LoRaWAN 1.0.4
- Region: Your region parameters (EU868)
- ADR algorithm: You can freely choose which ADR algorithm you need, in this case Default ADR algorithm is chosen.



In the Relay tab, now select “Device is Relay” and activate it by checking the “Relay enabled” option.

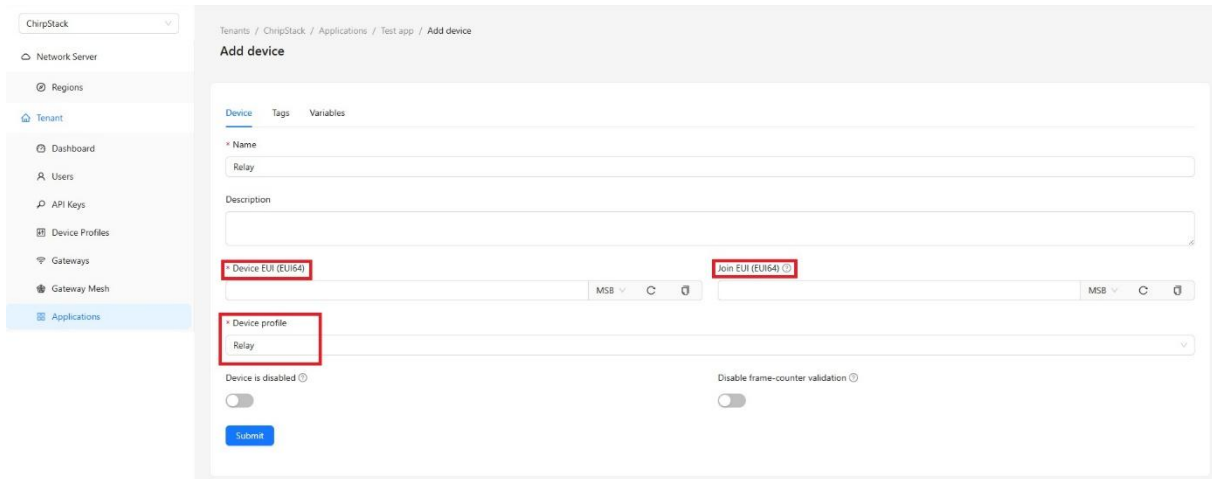


It is important to configure the reload rate for different uplinks. The value of 127 is unlimited, recommended for test use. For example, you can limit the “Notify limit reload rate” so that Relay does not notify every end device in its vicinity. If you need support in this area, please contact us!

4. Adding Relay/End Device in the application

To add Relay to the app, go to the "Applications" tab, select the app you want to add Relay/End Device to, or click "add application" to create a new application. Then, use the "add device" button.

When adding a device to the application, enter the device profile and the information we provide: DevEUI, JoinEUI.

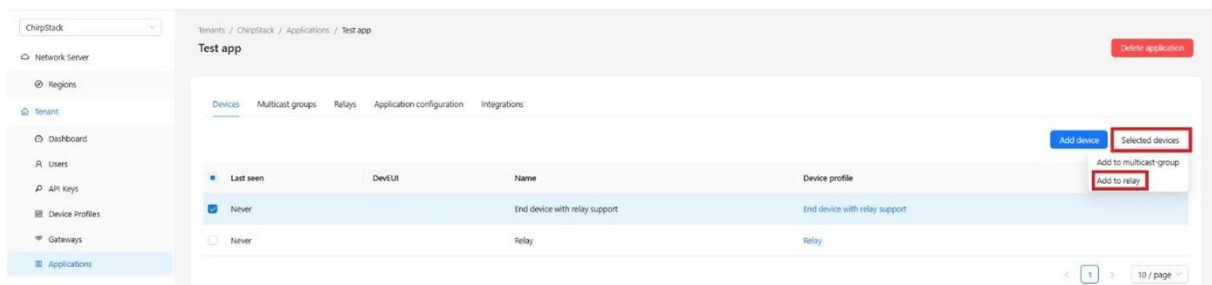


After pressing the “submit” button, you will be prompted to enter the application key.

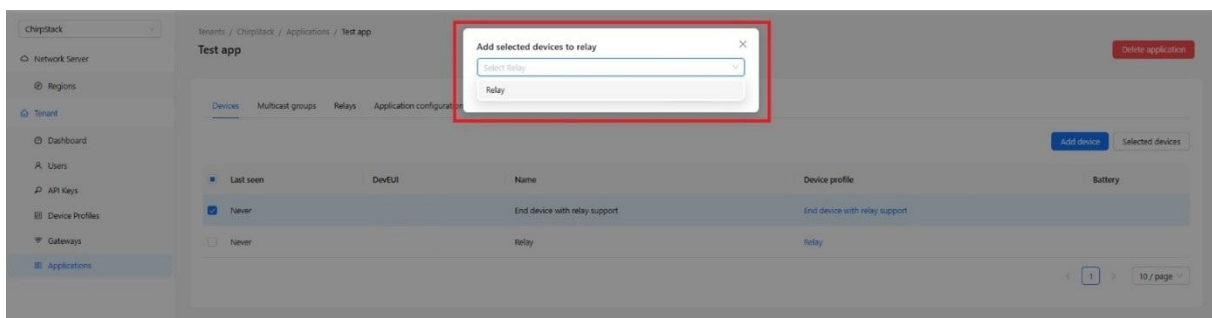
Next, repeat process with your end device. Remember to choose the device profile you made earlier “End device, with relay support”.

5. Adding devices to Relay

In order to add an end device to Relay, you need to add all devices to the application. The end device and Relay must be in the same application. Select the devices you want to add to Relay, press “selected devices” and then “add to Relay”.



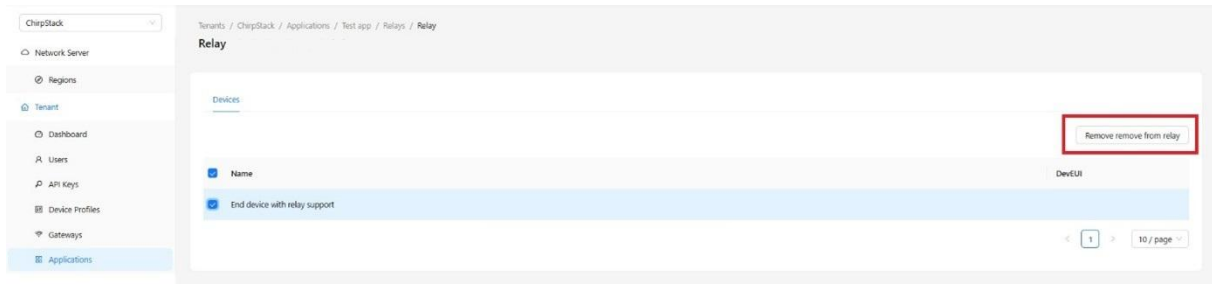
After selecting the “add to relay” option, a window will pop up where you need to select the Relay to which you want to add devices.



That's it. The devices have been added to Relay.

6. Removing devices from Relay

To remove a device from Relay, go to the “Relay” tab and select the Relay you want to manage. Then select the devices you want to remove. Check the boxes you want and then press the “Remove remove from relay” button.



That's it, now the devices will no longer be passed through Relay.

7. Force uplink on Relay for Ultrimis

To get the relay to transmit an uplink after installing it on ChirpStack you will need a magnet. On the relay there is a reed-switch, that forces an uplink/join request when triggered.



Apply magnet here