PE1MEW OTAA Join Request Tracer V1.0

The PE1MEW OTAA Join Request Tracer V1.0 is a program to track LoRaWAN nodes that use OTAA for personalisation and that are incorrectly commissioned. As a result of this, the node will send periodically JoinRequest messages that are not answered with a Join Accept to finalise the personalisation process.

The PE1MEW OTAA Join Request Tracer V1.0 can be used with the same hardware as used for a single channel gateway that can be found on Github: https://github.com/things4u/ESP-1ch-Gateway-v5.0

This manual will describe all functions of the PE1MEW OTAA Join Request Tracer V1.0.

License

The PE1MEW OTAA Join Request Tracer is free software:

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The program is using Arduino Libraries as provided by Arduino https://www.arduino.cc/ and are unmodified. For the license for these libraries see https://www.arduino.cc/en/Main/FAQ.

The program is built upon the code of Maarten Westenberg (mw12554@hotmail.com) that is provided under the terms of the MIT License which accompanies this distribution, and is available at https://opensource.org/licenses/mit-license.php

Disclaimer

The PE1MEW OTAA Join Request Tracer is distributed in the hope that it will be useful, but WITHOUT ANY WARRANTY; without even the implied warranty of MERCHANTABILITY or FITNESS FOR A PARTICULAR PURPOSE.

About the manual

This manual is using icons to indicate the priority or type of some information. The used icons are:

 Attention: Important information about the topic that will affect operation of the Rotor Controller.

 Information: Additional information about the topic, not mandatory for the proper functioning of the Rotor Controller.

 Observe: Observe the object mentioned.

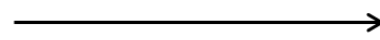 Audio: Information is provided through an audible tone.

Display

The PE1MEW OTAA Join Request Tracer has three displays:

1. Start-up display
2. Device display
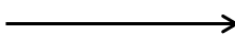3. RSSI Display.

Start-up display

Start message ⟶ **Starting Tracer**
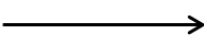
Figure 1: Sart-up display

Device display

Traced device number ⟶ Tracing device: 0

AppEUI of traced device ⟶ AppEUI:
70B3D57EF0005193

DevEUI of traced device ⟶ DevEUI:
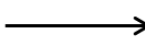0004A30B001F8621

Figure 2: Device display

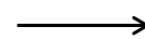### RSSI-display

Graphical presentation of RSSI (-130 to -30 dBm) ⟶

RSSI of received packets. Last first ⟶

Oldest received packet RSSI ⟶ -47
-46
-69
-51

Newest received packet RSSI ⟶ -102

Traced AppEUI/DevEUI pair ⟶ 0   11:56:57

GMT time the last packet was received ⟶

Figure 3: RSSI-display

Controls

The PE1MEW OTAA Join Request Tracer is using 2 buttons to control all functionalities. Instructions can be given by pressing a button at a time or by pressing a button a longer time.

In this manual Instructions are identified using the following icons:

Button-actions are visualized using a button with a hand where the time a button is pressed is shown. The button label is given.
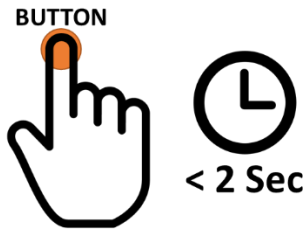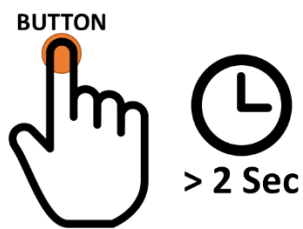

Figure 4: Press button < 2 seconds　　*Figure 5: Press button > 2 seconds*　　　　*Figure 6: Press reset button*

Operation

The PE1MEW OTAA Join Request Tracer helps in tracking devices. It can be used in a car or on a bike while crossing the area of interest.

While driving around, Signal strength reports are displayed. The stronger the signal the closer you get to the traced device.

Figure 7: Tracer in use

Set-up

The PE1MEW OTAA Join Request Tracer is used in combination with internet access. This can be delivered by using a mobile broadband router or a smartphone in hotspot mode.

Configuring

The PE1MEW OTAA Join Request Tracer is configured like a single channel gateway. It needs a Wi-Fi internet connection that is configured in the file "ESP-sc-gway.h". Add all Wi-Fi access points to this file with the required passwords.

```
// Please fill in at least ONE SSID and password from your own
// WiFI network below. This is needed to get the gateway working
// Note: DO NOT use the first and the last line of the stucture, these
// should be empty strings and the first line in te struct is reserved
// for WifiManager.

wpas wpa[] = {
    { ""  , "" },                          // Reserved for WiFi Manager
    { "accesspoint1", "password1" },
    { "accesspoint2", "password2" },
    { "accesspoint3", "password3" }
};
```

Program usage

Operation starts with powering the PE1MEW OTAA Join Request Tracer. The message "Starting Tracer" is displayed and a short single beep is audible.

Figure 8: Start message

After that the Wifi connection is made and the gateway is connected to the TTN back-end the actual device being traced is displayed with the associated AppEUI and DevEUI pair:
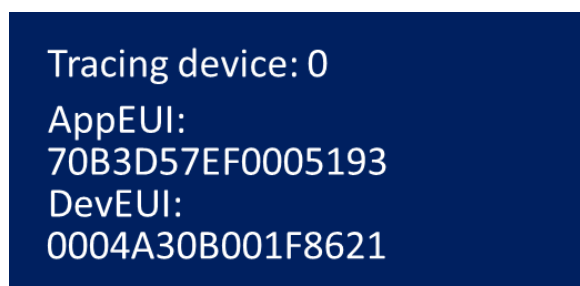

Figure 9: Selected device

When a Join request transmission of the observed device is received the actual RSSI is displayed together with the time of reception. The RSSI is displayed in both value in dBm and a proportional field strength bar where a low signal produces a short bar and a strong signal a long bar.

Figure 10: RSSI report

 When a packet of the selected device is received a short tone is audible.

When a new join request is received of the selected device the last RSSI is added to the bottom of the list where all previous RSSI reports are scrolled up.

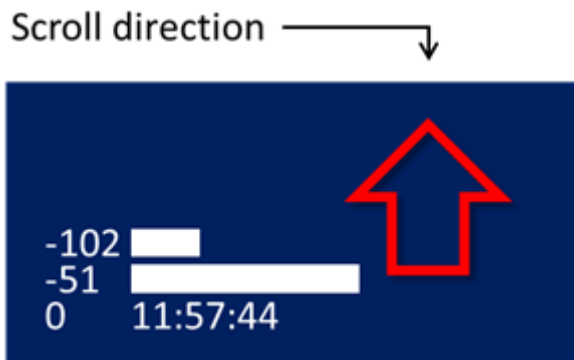*Figure 11: Scroll direction of RSSI reports.*

Switch device

To show the actual device that is traced press the button short. (< 2 seconds)
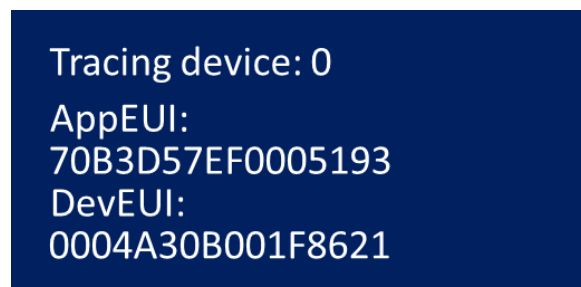

Figure 12: Actual device selected.

Device selection of the traced devices is done through pressing button longer than 2 seconds.

Devices are selected in a round-robin manner: 0, 1 ,2, 3, 4, 5, 0 etc.

To switch to the next device, press the button longer than 2 seconds.
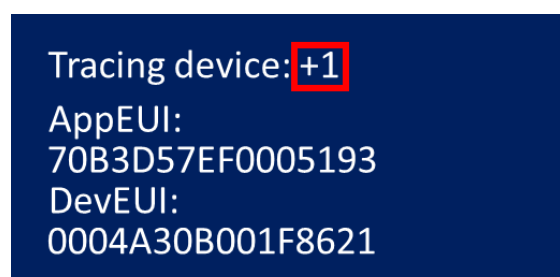The next device AppEUI and DevEUI pair is presented.

Figure 13: Next traced device is presented.