

Διαδίκτυο των Πραγμάτων (3^ο Εργαστήριο)

Αποστολή δεδομένων στο TTN μέσω LoRawan δικτύου

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Περιεχόμενα

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- Εισαγωγή στο Wasmote Libelium
- Δημιουργία εφαρμογής στο The Things Network (TTN)
- Εγγραφή της IoT συσκευής στο The Things Network (TTN)
- Αποστολή δεδομένων στο The Things Network (TTN)

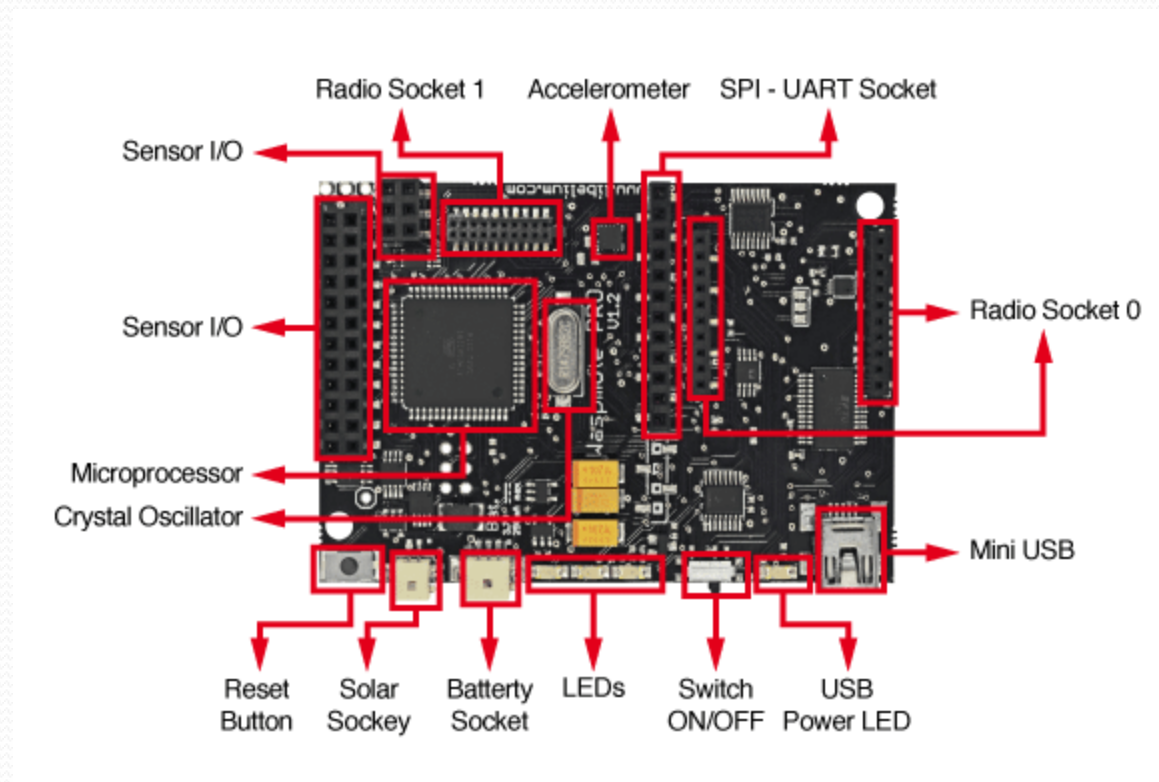


Wasp mote Libelium Microcontroller

- Το waspmote είναι η ανοιχτή πλατφόρμα της Libelium, η οποία χρησιμοποιείται από προγραμματιστές που ασχολούνται με IoT εφαρμογές.
- Η πλατφόρμα αυτή είναι τροποποιήσιμη, ισχυρή και ευέλικτη, καθώς μπορεί να συνδεθεί οποιοσδήποτε αισθητήρας, σε οποιαδήποτε πλατφόρμα νέφους (cloud platform) με την χρήση οποιαδήποτε τεχνολογίας για ασύρματης επικοινωνία.
- Μπορείτε να κατεβάσετε το περιβάλλον προγραμματισμού:
<https://development.libelium.com/waspmote-ide-v06/download-ide-windows>



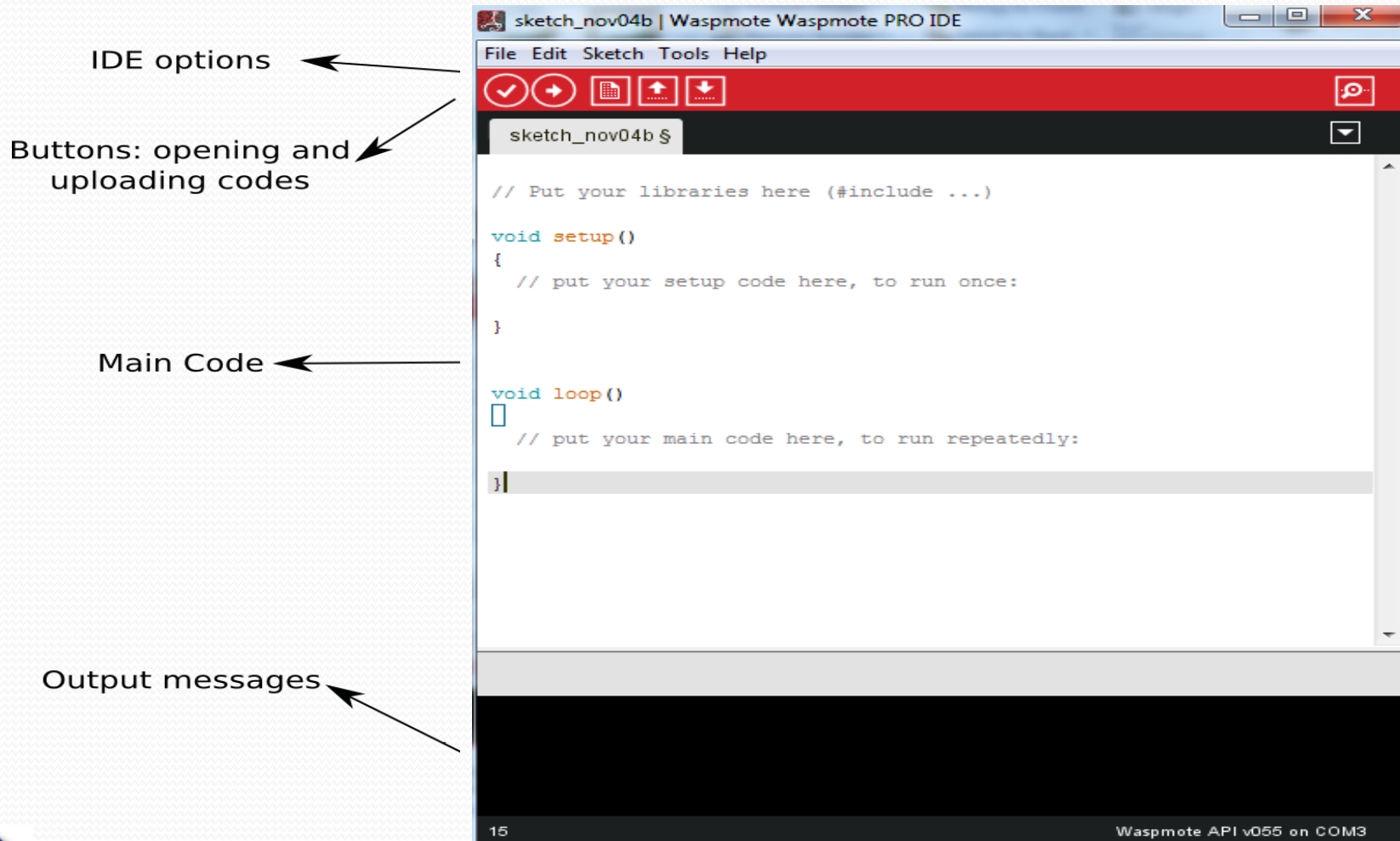
Wasp mote Libelium Microcontroller



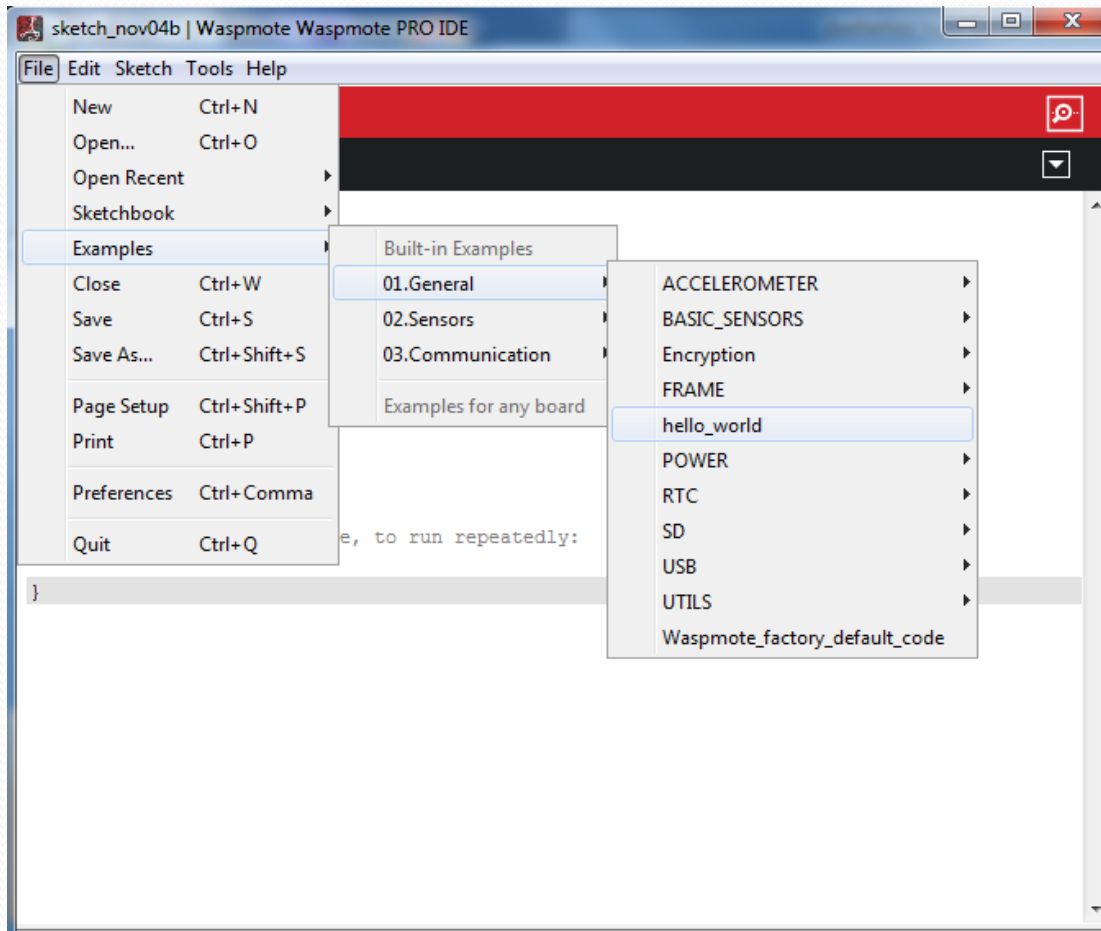
https://www.libelium.com/wp-content/uploads/2013/02/waspmote-datasheet_eng.pdf



Wasp mote Libelium IDE



Wasp mote Libelium IDE



```
void setup()
{
    USB.ON();
}
```

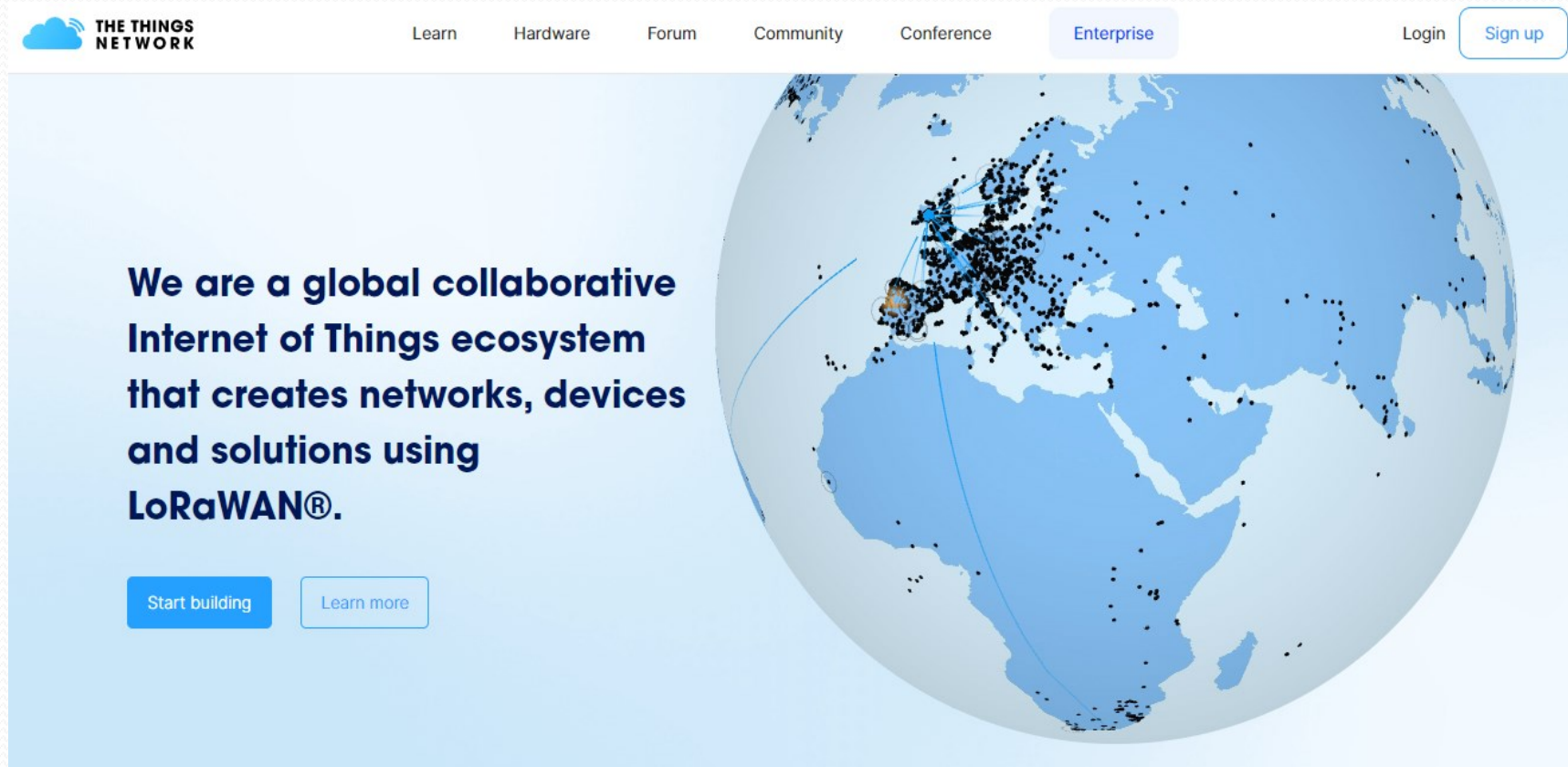
```
void loop()
{
    Utils.blinkLEDs(1000);

    USB.println(F("Hello World, this
is Waspmote!"));

    delay(2000);
}
```



The Things Network (TTN)



The screenshot shows the homepage of The Things Network. At the top, there is a navigation bar with the TTN logo on the left and links for 'Learn', 'Hardware', 'Forum', 'Community', 'Conference', 'Enterprise' (highlighted), 'Login', and 'Sign up' on the right. The main content area features a large globe on the right side, with numerous black dots representing LoRaWAN nodes, primarily concentrated in Europe. On the left side of the globe, the text reads: 'We are a global collaborative Internet of Things ecosystem that creates networks, devices and solutions using LoRaWAN®.' Below this text are two buttons: 'Start building' and 'Learn more'.

Σύνδεσμος ιστοτόπου : [Link](#)



TTN Application

The screenshot shows the TTN Application dashboard. The left sidebar contains the 'THE THINGS STACK SANDBOX' logo and navigation links: Home, Applications (highlighted with a red box), Gateways, Dashboard, Organizations, Notifications, User settings, Top entities, and a specific application 'samos-aegean-iot'. The main content area shows the 'Home > Dashboard' breadcrumb and a 'Top entities' section with tabs for All, Applications, Gateways, and End devices. A table lists the entity 'samos-aegean-iot' with its EUI and status 'Connected'.

THE THINGS STACK SANDBOX

Home > Dashboard

Home Applications Gateways

Search Ctrl K

Dashboard

Organizations

Notifications

User settings

Top entities

samos-aegean-iot

Top entities

All Applications Gateways End devices

TYPE	NAME	STATUS / LAST SEEN
	samos-aegean-iot eui-ac1f09fffe0607b6	Connected •



TTN Application

Applications > List

Applications (0)

NAME AND ID ▾

DEVICES

CREATED ▾

Search applications

+ Add application

No items found



TTN Application

Create application

Within applications, you can register and manage end devices and their network data. After
Learn more in our guide on [Adding Applications](#).

Application ID *

Application name

Description

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

Create application



TTN Application

Applications > iotnewapp > Application overview



iotnewapp
ID: iotnewapp

No recent activity • 0 End devices



TTN IoT Device

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Applications > iotnewapp > Application overview



iotnewapp
ID: iotnewapp

No recent activity • 0 End devices



End devices

Top end devices Recently active All

No top devices yet

Your most visited and bookmarked end devices will be listed here

+ Register end device



TTN IoT Device

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 tsipisdemoapp

Overview

End devices

Live data

Payload formatters

Integrations

Collaborators

API keys

General settings

End device type

Input Method

☐ Select the end device in the LoRaWAN Device Repository

☒ Enter end device specifics manually

Frequency plan ? *

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

LoRaWAN version ? *

LoRaWAN Specification 1.0.1

Regional Parameters version ? *

TS001 Technical Specification 1.0.1

Show advanced activation, LoRaWAN class and cluster settings

Provisioning information

JoinEUI ? *

00 00 00 00 00 00 00 00

Confirm



TTN IoT Device

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 tsipisdemoapp

Overview

End devices

Live data

Payload formatters

Integrations

Collaborators

API keys

General settings

Provisioning information

JoinEUI ⓘ *

00 00 00 00 00 00 00 00

Reset

This end device can be registered on the network

DevEUI ⓘ *

70 B3 D5 7E D0 05 73 A8

Generate

5/50 used

AppKey ⓘ *

DB DF 17 72 02 A2 C7 46 80 93 F0 D4 80 EB 2A BA

Generate

End device ID ⓘ *

eui-70b3d57ed00573a6

This value is automatically prefilled using the DevEUI

After registration

☒ View registered end device

☐ Register another end device of this type

Register end device



TTN IoT Device

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eui-70b3d57ed0006c191
ID: eui-70b3d57ed0006c191

No activity yet • 14 n/a up / n/a down

Device overview

Live data

Messaging

Location

Payload formatters

Settings

End device info

Device repository →



eui-70b3d57ed0006c191
This end device is currently not part of our Device Repository

Latest decoded payload

See in live data →

No recent activity
There haven't been any uplinks recently in this application

General information

End device ID
eui-70b3d57ed0006c191

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

LoRaWAN version
LoRaWAN Specification 1.0.1

Regional Parameters version
TS001 Technical Specification 1.0.1

Created at
Nov 18, 2024 15:06:04

Activation information

AppEUI
00 00 00 00 00 00 00 00

DevEUI
70 B3 D5 7E D0 06 C1 91

AppKey
.....

Session information

This device has not joined the network yet

Location

Map →

No location yet
There is no location data available

Set up a location

Πανεπιστήμιο Αιγαίου Τμήμα Μηχανικών
Πληροφοριακών και Επικοινωνιακών Συστημάτων

CCSL

TTN IoT Device

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tsipisdemoapp

Overview

End devices

Live data

Payload formatters

Integrations

Collaborators

API keys

General settings

 **eui-70b3d57ed00573a6**
ID: eui-70b3d57ed00573a6

↑ n/a ↓ n/a • No activity yet ?

OverviewLive dataMessagingLocationPayload formattersClaimingGeneral settings

General information

End device ID

eui-70b3d57ed00573a6

Frequency plan

Europe 863-870 MHz (SF9 for RX2 - recom...

LoRaWAN version

LoRaWAN Specification 1.0.1

Regional Parameters version

TS001 Technical Specification 1.0.1

Created at

Nov 4, 2022 18:53:43

Activation information

AppEUI

00 00 00 00 00 00 00 00

DevEUI

70 B3 D5 7E D0 05 73 A8

AppKey

.....

Live data

+ 18:53:43 Create end device

Location

Change location settings →

Πανεπιστήμιο Αιγαίου Τμήμα Μηχανικών
Πληροφοριακών και Επικοινωνιακών Συστημάτων

ccsl

Δραστηριότητα

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- Στο Eclass στον φάκελο “εργαστήριο” στην 3^η άσκηση κατεβάστε τον κώδικα “upload data to the TTN”
- Ανοίξτε το προγραμματιστικό περιβάλλον του Waspnote IDE.
- Αντιγράψτε τον κώδικα σε ένα κενό sketch.
- Ακολουθήστε τις οδηγίες της διαφάνειας 19.
- **Τι παρατηρείτε στην καρτέλα Live Data στο TTN;**



Δραστηριότητα

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Activation information

AppEUI

DevEUI

AppKey

```
LoRaWAN_10_join_otaa_send_confirmed | Waspnote Waspnote ...
File Edit Sketch Tools Help
LoRaWAN_10_join_otaa_send_confirmed $
// socket to use
////////////////////////////////////
uint8_t socket = SOCKET0;
////////////////////////////////////

// Device parameters for Back-End registration
////////////////////////////////////
char DEVICE_EUI[] = "xxxxxxxxxxxxxxxx";
char APP_EUI[] = "xxxxxxxxxxxxxxxx";
char APP_KEY[] = "xxxxxxxxxxxxxxxx";
////////////////////////////////////

// Define port to use in Back-End: from 1 to 223
uint8_t PORT = 3;

// Define data payload to send (maximum is up to data rate)
char data[] = "0102030405060708090A0B0C0D0E0F";

40 Waspnote API v055 on COM1
```

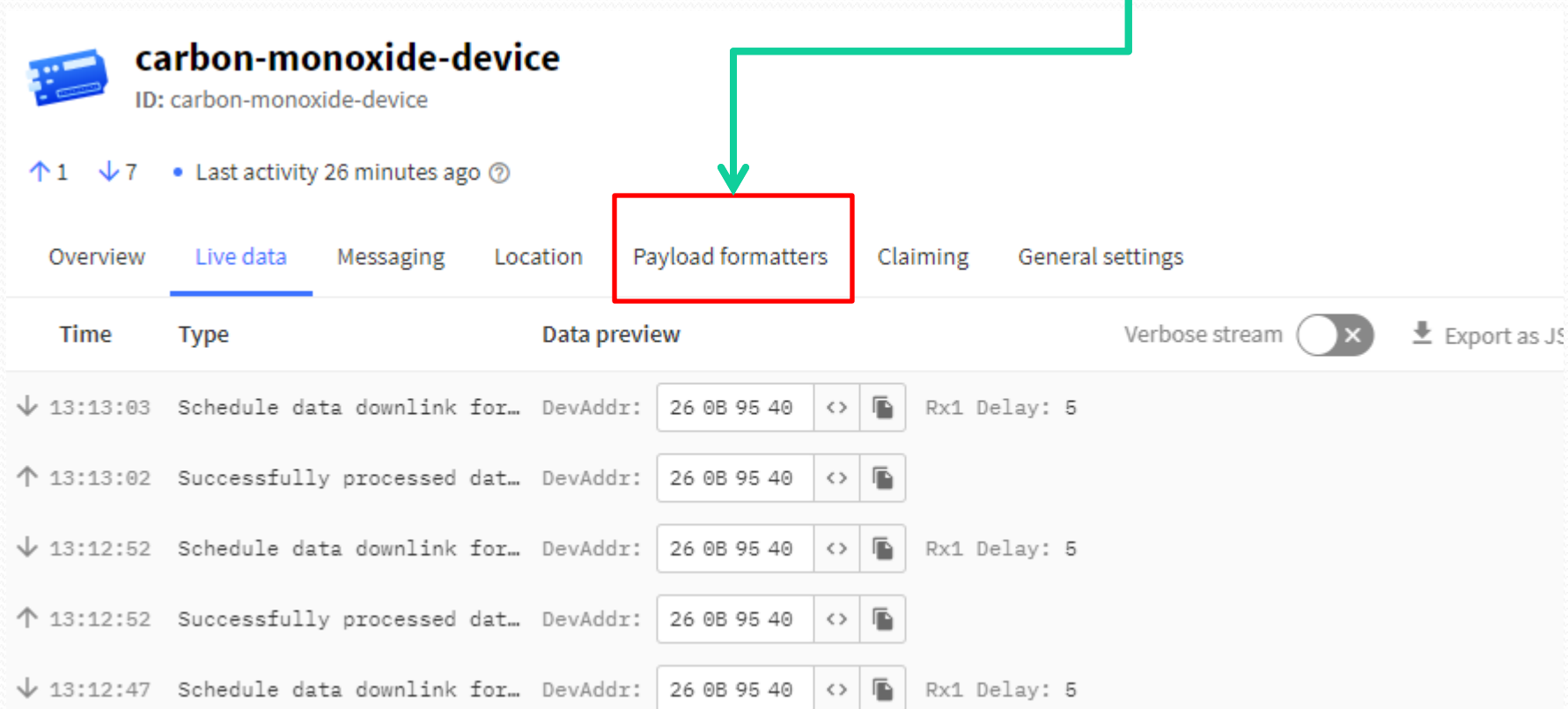
Αλλάζουμε την θύρα με βάση
τον υπολογιστή που
βρισκόμαστε π.χ. (1^{ος}
υπολογιστής από πάνω
αριστερά port =1)



Δραστηριότητα

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Αποκωδικοποίηση των δεδομένων που αποστείλαμε



carbon-monoxide-device
ID: carbon-monoxide-device

↑ 1 ↓ 7 • Last activity 26 minutes ago ⓘ

Overview Live data Messaging Location **Payload formatters** Claiming General settings

Time Type Data preview Verbose stream ☐ Export as JS

↓ 13:13:03	Schedule data downlink for...	DevAddr: 26 0B 95 40 <>	Rx1 Delay: 5
↑ 13:13:02	Successfully processed dat...	DevAddr: 26 0B 95 40 <>	
↓ 13:12:52	Schedule data downlink for...	DevAddr: 26 0B 95 40 <>	Rx1 Delay: 5
↑ 13:12:52	Successfully processed dat...	DevAddr: 26 0B 95 40 <>	
↓ 13:12:47	Schedule data downlink for...	DevAddr: 26 0B 95 40 <>	Rx1 Delay: 5



Δραστηριότητα

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Αποκωδικοποίηση των δεδομένων που αποστέλλουμε

Uplink Downlink

Setup

Formatter type*

Custom Javascript formatter

Formatter code*

```
1 function decodeUplink(input) {  
2   return {  
3     data: {  
4       x: input.bytes[0],  
5       y: input.bytes[1]  
6     },  
7     warnings: [],  
8     errors: []  
9   };  
10 }
```

Save changes



Δραστηριότητα

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Μετά την τροποποίηση του Payload formatter

↑ 13:52:56	eui-70b3d57ed005...	Forward uplink data message	DevAddr: 26 0B 3C 0E	<>	Payload: { bytes: [1,1,0], x: 1, y: 1 }	01 01 00	<>
↑ 13:52:21	eui-70b3d57ed005...	Forward uplink data message	DevAddr: 26 0B 3C 0E	<>	Payload: { bytes: [1,1,0], x: 1, y: 1 }	01 01 00	<>
↑ 13:51:46	eui-70b3d57ed005...	Forward uplink data message	DevAddr: 26 0B 3C 0E	<>	Payload: { bytes: [1,1,0], x: 1, y: 1 }	01 01 00	<>
↑ 13:51:10	eui-70b3d57ed005...	Forward uplink data message	DevAddr: 26 0B 3C 0E	<>	Payload: { bytes: [1,1,0], x: 1, y: 1 }	01 01 00	<>



Δραστηριότητα

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Καλείται η κάθε ομάδα ανάλογα με τον αισθητήρα που έχει ενσωματώσει στην πλακέτα waspmote pro, να συλλέξει τις μετρήσεις και να τις αποστείλει στο TTN.



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ΑΠΟΡΙΕΣ

