# LoRaWAN Configuration







## Table of Contents

First steps	3
Configuration	4
Software update	7
Downlink	8
1. JSON-Based Configuration (via Encoder)	8
2. Raw Byte Array Format	12
Payload Encoders/Decoders Repository	13
Annex I: TTN Server	14



### Read before starting

1. To complete this configuration, you will need to install the inBiot Setup app on your mobile device.



2. You will also need access to the LoRaWAN server, preferably using a different device (computer/laptop/tablet).

3. Before beginning the configuration, ensure that the device is in access point mode: This happens automatically the first time the MICA is powered on. If not, press the touch button located on the MICA logo until the light turns blue and begins to rotate.



1. Open the inBiot Setup application on your mobile device. Follow the on-screen instructions to complete the initial configuration of the device.



2. In the main menu, select the "Cloud Connectivity" option and locate the "Device EUI" field. Carefully note down this unique and immutable value, as it is crucial for the device's configuration on the LoRaWAN server. On the same screen, you will find the "App EUI" and "AppKey" fields with default values. You can modify these values if you wish, as long as they match the ones configured on your LoRaWAN server. Do not press "Continue" until you have completed step number 3.

Main menu Select an option	App EUI	
	Dev EUI 00 80 E1 15 03 41 CF ED	Default values
	AppKey 6C 4B C4 BF 5C 68 8B 3F AB 41 81 F6 E6 88 BD D4	App EUI
		23 A1 10 68 E4 8A F1 04
		АррКеу
INFORMATION A UPDATES		5C 4B C4 BF 5C 68 8B 3F AB 41 81 F6 E6 88 B
	1 1	
SAVE ALL CHANGES AND FINALISE	CONTINUE	

**3**. Access your LoRaWAN server and start the process of registering a new end device. In the "DevEUI" field, enter the values you obtained in step 2 of the guide. In the "AppEUI" and "AppKey" fields, enter the values you configured or found as default in the configuration application (make sure they match the device exactly).

4. Save the device configuration on your LoRaWAN server.

5. Once the device is registered, continue with the LoRaWAN configuration and verify the device's proper connection to the server.

Introduce credentials         EUI         A1       10       68       E4       8A       F1       04         B0       E1       15       03       41       CF       ED         Rey       B0       CH       50       68       BD       D4         B0       E1       15       03       41       CF       ED         Key       B0       CAHF 50       68       BD       D4         B0       CAHF 50       68       BD       D4         CONTINUE       CANCELAR       CANCELAR				
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		CONT	INUE	

6. If MICA has sufficient coverage and the credential configuration has been done correctly, you will see a green flashing light indicating a successful connection to the server. If not, the flashing will be red, and you will need to check the configured credentials or the network coverage range.

	^	C Dack Coning	
MICA has successfu connected!	lly	MICA could the	not connect to server
Your device is sending IAQ of periodically through LoRaW	data /AN		
BACK TO MENU		TRY	AGAIN
Return to menu to save cha All changes will be deleted if no	nges. ot saved.	H	ELP

7. After validating the proper connection of the device to the server, return to the main menu and save the changes made to finalize and exit the access point. At this point, your MICA device should be correctly configured and connected to your LoRaWAN server.

15:12 < Back Configure devi	n ବ Ce X	15:12 K Back	Configure device	.	15:12 K Back	Configure device	
MICA has succes connected!	ssfully		Main menu Select an option		Cor	nfiguration completec the changes have been saved successfully.	<b>.</b>
periodically through Lo	RaWAN				Follow ti	Device ID 0C8B-9564-1290 ( ne steps below to add the Milv your My inBiot account:	CA to
					3. On the 'Add MIC	<ol> <li>Copy the device ID.</li> <li>Log in to My inBiot.</li> <li>Start page click the total button, A', paste the device ID and fill</li> </ol>	, select in the
BACK TO MER	NU		& UPDATES			ADD NOTE	
Return to menu to save All changes will be deleted	e changes. I if not saved.	SAV	E ALL CHANGES AND FINALI	SE		SET UP ANOTHER DEVICE	

## Software update

## Update steps

1. In the main menu of the inBiot Setup app, select the "Information & Updates" option, then click on "Check for Updates," and then select "Update".

15:12 all to ES	< Back Configure device X	12:58
Main menu Select an option	Moldel: MIGA_LORA_000_VAC	There's a firmware update available for this device
	ID: 0C8B-9564-1290 MAC: 0C:8B:95:64:12:90 Firmware version: 1.7	Update information Current firmware version: 2.1 New firmware version: 2.2
SAVE ALL CHANGES AND FINALISE	SEARCH FOR UPDATES BACK TO MENU	CANCEL

2. The device will check the internet connection. If it is not connected, you should follow the steps to configure a Wi-Fi network. Otherwise, the device will update automatically.



## Downlink

This section outlines the configurable parameters that can be transmitted to the MICA device via LoRaWAN downlink messages. Parameters can be sent individually or combined into a single message, either using a supported JSON encoder or directly in raw byte array format.

### 1. JSON-Based Configuration (via Encoder)

A custom encoder is available to convert JSON-formatted commands into the appropriate byte payload. This encoder is compatible with Chirpstack v3/v4, The Things Network (TTN), and Milesight LoRaWAN gateways.

#### Supported parameters

```
ledStatus - Enable/Disable device LED
```

Type: boolean

Values:

- true: Enable LED
- false: Disable LED

Example: {"ledStatus": true}

timeToSend - Uplink transmission interval (in minutes)

Type: uint8

Values: 0 to 60

- 0: Default interval (15 minutes)
- 1 60: Custom interval in minutes

Example: {"timeToSend": 30}

ventilation - CO<sub>2</sub> auto-calibration cycle

Type: uint8

Options:

- 1: Every 48 hours Manual ventilation
- 2: Every 24 hours (default) Mechanical ventilation
- 3: Every 7 days Low ventilation
- 4: Every 15 days No ventilation
- 5: Disabled

```
Example: {"ventilation": 3}
```

ledConfiguration - LED indicator mode

```
Type: uint8 (0-15)
```

#### Modes:

- 0: Ventilation Efficiency (default)
- 1: Thermohygrometric Comfort
- 2: Temperature
- 3: Humidity
- 4: CO<sub>2</sub>
- 5: **TVOC**
- 6: PM2.5
- 7: PM10
- 8: Virus Spread Risk
- 9: Indoor Air Quality (IAQ)
- 10: PM1.0
- 11: PM4.0
- 12: Formaldehyde (CH<sub>2</sub>O)
- 13: Ozone (O<sub>3</sub>)
- 14: Nitrogen Dioxide (NO<sub>2</sub>)
- 15: Carbon Monoxide (CO)
- 16: Mold Persistence

```
Example: {"ledConfiguration": 9}
```

touchEnable - Enable/Disable capacitive touch button

Type: boolean

Values:

- true: Enable touch button
- false: Disable touch button

```
Example: {"touchEnable": true}
```

ADREnable - Enable/Disable Adaptative data rate

Type: boolean

Values:

- true: Enable ADR (default)
- false: Disable ADR

```
Example: {"ADREnable": true}
```

```
DR - Data Rate
Type: uint8 (0-5)
Modes:

0: LoRa SF12 / 125 kHz, bit rate 250 bit/s
1: LoRa SF11 / 125 kHz, bit rate 440 bit/s
2: LoRa SF10 / 125 kHz, bit rate 980 bit/s
3: LoRa SF9 / 125 kHz, bit rate 1760 bit/s
4: LoRa SF8 / 125 kHz, bit rate 3125 bit/s
```

• 5: LoRa SF7 / 125 kHz, bit rate 5470 bit/s

**Example**: { "DR": 5 }

```
sendRetransmissions - Confirmed / Unconfirmed uplink retransmissions
Type: uint8
Valid range: 0 to 15
• 5: Default value
Example: {"sendRetransmissions": 10}
```

```
confirmationEnable - Enable/Disable uplink confirmation
```

Type: boolean

Values:

- true: Enable confirmation (default)
- false: Disable confirmation

```
Example: {"confirmationEnable": true}
```

```
resetDevice - Software reset the device
```

Type: boolean

Values:

- true: Reset device
- false: No reset needed

```
Example: {"resetDevice": true}
```

## Full example

- -	$\mathbb{N}$ lodgt at us $\mathbb{Z}^{\prime}$ true
۷.	redocatuo . crue,
3	"timeToSend":30,
4	"ventilation":1,
5	"ledConfiguration":4,
6	"touchEnable":true,
7	"ADREnable":false,
8	"DR":2,
9	"sendRetransmissions":5,
10	"confirmationEnable":true,
	"resetDevice": false
12	

Note: Parameter order within the JSON object is irrelevant. The encoder will handle correct arrangement and packing.

### 2. Raw Byte Array Format

In platforms where JSON encoders are not supported, parameters may be sent directly as a byte array. Each parameter is structured using the format:

[ <Command ID>, <Length>, <Value(s)> ]

Multiple parameter blocks can be concatenated to create a composite payload.

#### Parameter Byte Structures

	Parameter	Command ID	Length	Values (Hex)
1	ledStatus	0x01	0x01	0x01: enable, 0x00: disable
2	timeToSend	0x02	0x01	0x0F: default (15min), or custom uint8 value
3	ventilation	0x03	0x01	0x00: 24h (default), 0x01: 48h, 0x03: 7d,etc
4	ledConfiguration	0×04	0x01	0x00 to 0x010 per available modes
5	touchEnable	0x05	0x01	0x01: enable, 0x00: disable
6	ADREnable	0x09	0x01	0x01: enable, 0x00: disable
7	DR	0x0A	0x01	$0 \times 00$ to $0 \times 05$ per available options
8	sendRetransmissions	0x0B	0x01	0x00 to 0x0F per available values
9	confirmationEnable	0x0D	0x01	0x01: enable, 0x00: disable
10	resetDevice	0×0F	0x01	0x01: reset, 0x00: no reset

#### Example

To configure the device with:

- LED enabled
- Uplink interval: 30 minutes
- CO<sub>2</sub> calibration every 7 days
- LED mode: IAQ indicator
- Touch button disabled
- ADR Disable
- DR 2 (SF 10)
- 9 Retransmissions
- Uplink confirmation enabled
- No reset device

Payload:

```
[0x01, 0x01, 0x01, 0x02, 0x01, 0x1E, 0x03, 0x01, 0x03, 0x04, 0x01, 0x09, 0x05, 0x01, 0x00, 0x10, 0x01, 0x00, 0x0A, 0x01, 0x02, 0x0B, 0x01, 0x09, 0x0D, 0x01, 0x01, 0x0E, 0x01, 0x00]
```

## Payload Encoders/Decoders Repository 🤸

The decoding (Uplink) and encoding (Downlink) scripts used by this device are publicly available in the following repository:

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	Decoder 1.0.0 - inBiot FW Version	ns 1.0 - 2.1		
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These scripts enable proper interpretation of the data sent by the device (Uplink payloads) and the generation of valid commands to be sent from the network to the device (Downlink payloads), in compliance with the communication protocol format defined by the device's LoRaWAN specification.

### Compatibility

The scripts are ready for direct use on platforms such as:

- The Things Network
- Chirpstack v3 / Chirpstack v4
- Milesight DeviceHub V2

## Example of configuring the LoRaWAN server with TTN

After checking the LoRaWAN credentials through the inBiot Setup configuration app, you can proceed to register the device on the TTN platform.

Register end device - Mica-LoR ×									- a x
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E Live data	eui-0080e1156	0516d39d		80.50 E1 15 85 1E 03 90	8.	et et et et et et et et	e1 (%)		Feb 7, 2024 •
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O- API keys	eui-0080e115	051d5759	LoRa-Sigfox VAC	00 80 E1 15 05 10 57 59	1	62 02 02 02 01 01 01	01		Dec 1, 2023 •
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In this new tab, select "Enter end device specifics manually" to configure the credentials of your MICA.

Register end device - Mica-LoR ×			- 0 >
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1 Mica-LoRa	Applications > Mica-LoRa > End devices		
Overview	Register end device		
Lend devices	Does your end device have a LoRaWAN <sup>®</sup> Device Identification QR Code? Scan it to speed up onboarding.		
Live data	Scan end device QK code     Biselice registration neip in		
> Payload formatters ~	End device type		
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Live data  Payload formatters  Alternations  Collaborators  API keys  General settings	JoinEUI © * (01 23 45 67 89 AB CD EF) Reset This end device can be registered on the network DevEUI © * (00 80 E1 15 05 41 CF ED)		
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Once you have set up the credentials you want and created the device on the LoRaWAN server, you can complete the configuration of the MICA from the configuration app.

Mica-LoRa							
Overview	eui-0080e115	eui-0080e1150541cfed ID: eui-0080e1150541cfed					
End devices	↑ 689 🔸 688 🔹 Last activit	↑689 ↓688 • Last activity 13 minutes ago ⑦					
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Collaboratore	Frequency plan	Europe 863-870 MHz (SF9 for RX2 - recommended)	13:10:12 Delete end device				
Conaborators	LoRaWAN version	LoRaWAN Specification 1.0.2	↓ 13:05:19 Schedule data downl: ↑ 13:05:19 Forward uplink data	ink for transmission on Gateway Server DevAd message DevAddr: 26 08 4F 68 ↔ IB Pavlo			
API keys	Regional Parameters version	RP001 Regional Parameters 1.0.2	↑ 13:05:19 Successfully process	sed data message DevAddr: 26 08 AE 68 🗘 🗍			
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After validating the device's connection from the inBiot Setup application, you will be able to observe the device's activity, and it will begin to send information periodically.

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