EFENTO

Efento Gateway BLE - LTE

User manual

V 1.1

15.11.2024

Introduction

Thank you for choosing the Efento LTE Gateway! This manual provides essential information for operating the Efento Gateway safely and effectively. By following the guidelines in this manual, you can reduce the risk of damage to your device.

The Efento LTE Gateway has been designed with user safety and ease of use in mind. However, improper or incorrect use of the device can pose risks. We highlight these potential hazards in the "Safety" section and with safety notes throughout this manual. Please follow all safety instructions carefully.

Markings

You may find the following symbols on the Efento Gateway or its packaging:

CE Mark of Conformity: Indicates compliance with the Radio Equipment Directive (RED) 2014/53/EU.

Dustbin Symbol: Efento products should not be disposed of with household waste. Please dispose of them according to local laws and regulations.

RoHS Symbol: Indicates compliance with the RoHS Directive 2002/95/EC.

Liability

The information contained in this operating manual describes but does not guarantee the features of the product. No liability is accepted for damage caused by:

- improper use,
- failure to follow the operating manual,
- unauthorized modifications of the Efento Gateway,
- improper work on and with the Efento Gateway,
- unauthorized repairs,
- emergencies, external influences or force majeure.

Intended Use

Efento LTE Gateway is used to transfer the data from Efento Bluetooth Low Energy sensor to Efento Cloud and / or any third party server / cloud platform. The Efento LTE Gateway can only be operated under the conditions of use described in the user manual.

Manufacturer address

Efento sp. z o.o., Ul. Krupnicza 14/5, 31-123 Krakow, Poland

Technical support

Support portal: help.efento.io

Safety

DANGER

Risk of battery explosion due to improper battery types or damaged batteries.
Do not replace or remove the battery on your own and never use damaged batteries!

Risk of device malfunction or damage due to extreme temperatures.
Do not expose the device to extreme temperatures outside of the operating limits!

CAUTION Store the device protected from direct sunlight, heat or fire!

CAUTION Only use the device with its antennas connected. Operating the Efento LTE Gateway without antennas may cause damage.

NOTICE Alterations or modifications not approved by the manufacturer void device use authorization.

NOTICE Read the user manual before using Efento LTE Gateway.
In case you have any questions, please contact our technical support at help.efento.io

Overview

The Efento Gateway is a network device that transmits data from Efento sensors to Efento Cloud or other cloud platforms/servers. It can support up to 128 wireless sensors and is equipped with memory capable of storing up to 500,000 sensor measurements. In case of connectivity issues, the device will automatically resend any missing data once the connection is re-established.

The Gateway offers various security features, including encrypted communication (AES128 between sensors and the gateway, and TLS/SSL between the gateway and the server), proxy server support, and authorization via custom HTTP headers.

The device operates on USB power (5V, 1A) and includes a backup battery, providing up to 12 hours of power during outages. Data transmission to the server is carried out over REST protocol (HTTP or HTTPS). The Efento Gateway has a maximum range of up to 100 meters in open spaces and 20-30 meters indoors, depending on the building structure.

The Efento Gateway can be configured with a free mobile app, allowing easy setup for users.

Technical data

BLUETOOTH	Communication: Bluetooth Low Energy (BLE) Encryption: AES128 Radio frequency: 2,4 GHz Power: 2,5 mW (4 dBm) Range: up to 100 m (LOS) Transmission frequency: 1 s
LTE	Standard: LTE Cat 1 Supported bands: LTE-FDD 1/3/5/7/8/20/28
SUPPORTED PROTOCOLS	HTTP, HTTPS, REST
WORKING CONDITIONS	0 – 40°C, 10 – 90% RH Indoor use only
POWER	Power adapter: USB C, 230V AC, 5V DC / 1.0 A Backup battery: LI-Po, 1900 mAh (up to 12 hours backup power)
DIMENSIONS	Size: 110 x 80 x 25 mm Weight: 105 g

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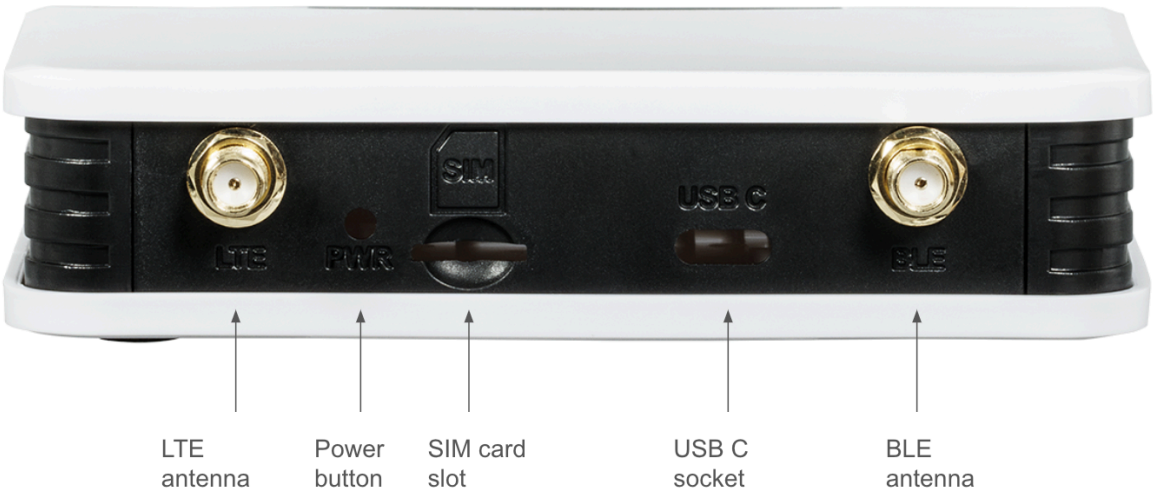
Configuration

The Efento LTE Gateway can be set up using a free Android mobile application. The app allows users to quickly configure the gateway to connect to Efento Cloud or other cloud platforms.

Before you start

Before powering on and configuring the device, ensure that:

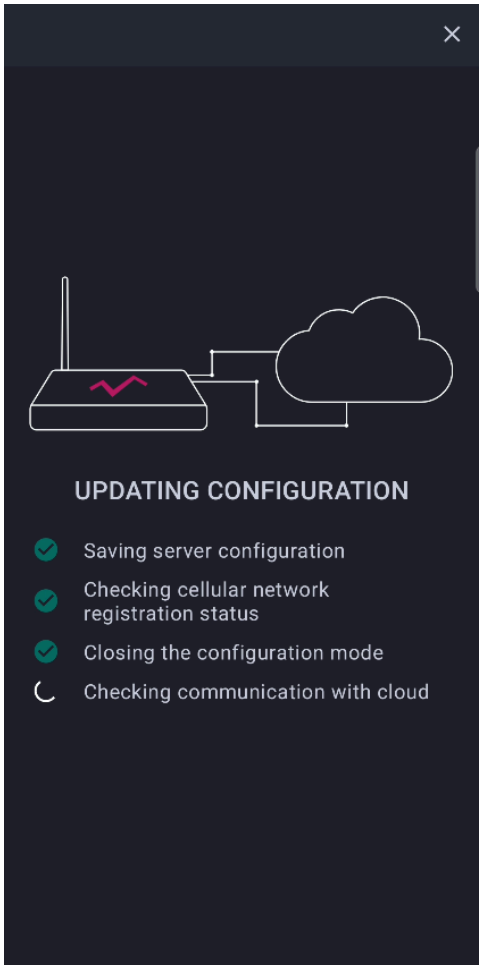
- Both antennas (LTE and BLE) are connected to the gateway.
- A nano-size SIM card is inserted into the SIM card slot.
- The device is connected to a power source via a USB-C adapter.
- You have installed the Efento mobile application on your mobile phone.



Configuring Gateway for Efento Cloud

1. **Power On the Gateway**: Press the power button labeled “PWR” on the back panel.
2. **Launch the Efento Mobile App**: Open the Efento mobile app for Android, and sign in to your Efento Cloud account.
3. **Navigate to Add Gateway**:
    a. From the main menu, select **Organization settings > Add sensors > Bluetooth Low Energy**.
    b. Tap on “Add gateway.”
4. **Activate Configuration Mode**: When the gateway powers on, it automatically enters configuration mode—no additional steps are needed (the blue LED on the front panel will blink rapidly, confirming that the gateway is now in configuration mode). To re-enter configuration mode later quickly press the “PWR” button twice.

5. **Connect to the Gateway**: The gateway's serial number will appear in the mobile app. Tap on it to connect and begin configuration.
6. **Set Network Parameters**:
    a. **APN (Access Point Name)**: Enter the APN provided by your SIM card provider. If login and password are required, check "Use username and password," or select "Automatic" to use the default APN.
    b. **PLMN (Public Land Mobile Network)**: Enter the unique code for your mobile network or select "Obtain automatically."
7. **Save Settings**: Tap "Save" to apply your settings.
8. **Verify Connection**: Once saved, the gateway will attempt to connect with Efento Cloud. If successful, you can proceed to add sensors to your organization.



Configuring Gateway for custom server

You can set Efento Gateway to send the data to a custom server. Efento Gateway will send the data over http / https (REST API - POST). To configure the gateway to send the data to a custom server:

1. **Power On the Gateway**: Press the power button labeled "PWR" on the back panel.
2. **Launch the Efento Mobile App**: Open the Efento mobile app for Android and navigate to "Nearby devices" (if you open the app for the first time, the app will ask you to choose how you want to use it.

You can switch between “Efento Cloud” and “Nearby devices“ by entering apps menu (three lines in the upper left corner -> Efento Cloud / Nearby devices)

3. **Activate Configuration Mode**: When the gateway powers on, it automatically enters configuration mode—no additional steps are needed (the blue LED on the front panel will blink rapidly, confirming that the gateway is now in configuration mode). To re-enter configuration mode later quickly press the “PWR” button twice.
4. **Connect to the Gateway**: The gateway’s serial number will appear in the mobile app. Tap on it to connect and begin configuration.
5. **Configure the Gateway**: The gateway’s configuration is split into three tabs (you can sn the tabs by selecting them from the upper bar)
    - **Network Parameters**:
        - **APN (Access Point Name)**: Enter the APN provided by your SIM card provider. If login and password are required, check “Use username and password,” or select “Automatic” to use the default APN.
        - **PLMN (Public Land Mobile Network)**: Enter the unique code for your mobile network or select “Obtain automatically.”
        - **DNS (Domain Name System)**: Set the address of the DNS server. By default it is set to 8.8.8.8
        - **NTP (Network Time Protocol)**: Set the address of the NTP server. By default it is set to pool.ntp.org
    - **Server settings**:
        - **Server address**: Address of the server to which the Gateway sends the data. Both IP and domain address are accepted
        - **Server port**: Port to which the data is sent
        - **TLS**: Enable or disable secure communication between the Gateway and the server
        - **Organization token**: Optional API token sent to the server in HTTP header by the Gateway along with the data.
    - **Encryption keys**: Communication between Efento sensors and Efento Gateway can be encrypted with a key set by the user. If the communication is encrypted, devices which do not have the encryption key added, will not be able to decode the transmission and read the sensor's measurements. You can add up to four encryption keys to Efento Gateway. Once a key is added, the gateway will be able to decrypt and read the measurements from all the sensors, which use the same encryption key (you can set the key on the sensors with Efento mobile app).
6. **Verify Connection**: Once saved, the gateway will attempt to connect with the server. You can check the current status of the network connection and server communication in “Status” (three dots in the upper corner -> Status).

Status

To check the gateway status, tap the three dots in the upper left corner and select “Status”. The Status information include:

- **Serial Number**: Unique identifier for the gateway.
- **Software Version**: Current version of the gateway’s software.
- **Last Communication**: Date and time of the gateway's most recent communication with the server.
- **Communication Status**: The outcome of the gateway's last communication attempt with the server:

    - **Success**: Communication with the server was successful.
    - **Server Connection Error**: The gateway was unable to connect with the server.
    - **Communication Issue Indicators**: Statuses indicating a problem preventing communication with the server. These may include: DNS error, Invalid NTP address, NTP connection error, NTP invalid time received, Server invalid address, Server connection error, Server unknown error
- **Registration Status**: The gateway's current network registration status:
    - **Registered (Home/Roaming)**: The gateway is registered on a home or roaming network.
    - **Not Registered**: The gateway is not registered on any network.
    - **Searching**: The gateway is searching for a network to register with.
    - **Registration Denied**: The selected network does not permit the gateway to register.
- **IMEI**: IMEI number of the LTE module in the gateway.
- **ICCID**: ID of the SIM card used by the gateway.
- **PLMN**: PLMN code of the network the gateway is connected to.
- **Signal Quality Parameters**:
    - **RSSI**: Received Signal Strength Indicator
    - **RSRP**: Reference Signal Received Power
    - **SINR**: Signal-to-Interference-plus-Noise Ratio
    - **RSRQ**: Reference Signal Received Quality

Restoring factory defaults

To restore the gateway to its factory default settings:

1. Quickly press the "PWR" button on the back panel **7 times**.
2. The LEDs will blink sequentially, indicating that the gateway is resetting all settings and clearing all stored measurements from its memory.
3. Once the process is complete, the gateway will restart with its default settings.

Changing the password

You can secure the gateway configuration with a password. Once set, users must provide the password to view or modify settings. Follow these steps to set or change the password:

1. **Open the Efento Mobile App**: launch the Efento mobile app on your Android device and navigate to the “Nearby devices” section.
2. **Activate Configuration Mode:** when the gateway powers on, it automatically enters configuration mode (indicated by the blue LED blinking rapidly). To re-enter configuration mode later, quickly press the “PWR” button twice.
3. **Connect to the Gateway:** locate the gateway’s serial number in the app and tap it to connect.
4. **Change the Password:** Tap the three dots in the top-right corner of the app screen and select **“Change Password”**. Enter the new password and save the settings.

Powering Off the Gateway

To turn off the gateway press and hold the **PWR** button on the back panel for **5 seconds**. The blue LED will switch off, confirming that the gateway is powered down.

API

The Efento Gateway sends two types of data frames to the server:

- Measurements - measurements taken by the sensors in Gateway's range
- Heartbeat messages - messages containing information about the status of the Gateway

Measurements

ENDPOINT	/api/v4/measurements
METHOD	POST

HEADERS	`Content-Type: application/json`
	`charset=UTF-8`
	`X-Api-Token: <value of the "Organization Token" field>`

The HTTP request body contains measurements in a JSON. One message can contain multiple measurements from one sensor (e.g. if the gateway reestablished the Internet connection and it resends the data) or measurements from multiple sensors - if there are few sensors in gateway's range, gateway will send data from multiple sensors in one message.

```
{
  "measurements" : [
      {
        "serial" : [string], // serial number of the sensor
        "response_handle":[number], // sensor ID in response (optional)
        "battery" : [string], // battery level: ok/low
        "signal" : [number], // RSSI
        "measured_at" : [string], // UTC date
        "measurement_interval" : [number], // measurement interval in seconds
         "next_measurement_at" : [string], // next connection date
        "params" : [
          {
           "channel" : [number], // sensor channel number: 1/2/3
           "type" : [string], // temperature / humidity / pressure / pressure_diff / open-close
           "value" : [string],
```

```
            “status” : [string] // status of the measurement - ‘ok’ or ‘error’
          }
        ]
      }
    ]
}
```

Examples of the messages sent by Efento Gateway to the server:

```
{
      "measurements" : [
      {
            "serial" : "282C024FFFB1",
            "response_handle": 1,
            "battery" : "ok",
            "signal" : -70,
            "measured_at" : "2024-10-12 15:28:21 UTC",
            "measurement_interval" : 180,
            "next_measurement_at" : "2024-10-12 18:28:21 UTC",
            "params" : [
                  { "channel": 1, "type": "temperature", "value": 6 , "status" : "ok"}
                  ]
      },

      {
            "serial" : "282C024FFFB2",
            "response_handle": 2,
            "battery" : "ok",
            "signal" : -70,
            "measured_at" : "2024-10-12 15:28:21 UTC",
            "measurement_interval" : 180,
            "next_measurement_at" : "2024-10-12 18:58:21 UTC",
            "params" : [
                  { "channel": 1, "type": "temperature", "value": 12, "status": "ok"},
                  { "channel": 2, "type": "humidity", "value": 51, "status": "ok"}
                  ]
      },
      {
            "serial" : "282C024FFFB3",
            "response_handle": 3,
            "battery" : "ok",
            "signal" : -70,
            "measured_at" : "2024-10-12 15:28:21 UTC",
            "measurement_interval" : 180,
            "next_measurement_at" : "2024-10-12 20:28:21 UTC",
            "params" : [
                  { "channel": 1, "type": "temperature", "value": 50, "status": "ok"},
                  { "channel": 2, "type": "humidity", "value": 30, "status": "ok"},
                  { "channel": 3, "type": "pressure_diff", "value": 21, "status": "ok"}

                  ]
```

```
    },

    {
            "serial" : "282C024FFFB4",
            "response_handle": 4,
            "battery" : "ok",
            "signal" : -70,
            "measured_at" : "2024-10-12 15:28:21 UTC",
            "measurement_interval" : 180,
            "next_measurement_at" : "2024-10-12 16:28:21 UTC",
            "params" : [
                    { "channel: 1, "type: "open-close", "value: "open", "status": "ok"},
                    { "channel":2, "type":"open-close", "value":"closed", "status":"ok"},
                    { "channel":3, "type":"open-close", "value":"closed", "status":"ok"}

                  ]
    }
  ]
}
```

The server should always answer with "**201 Created**" to a message sent by Efento Gateway. Otherwise, the gateway will consider the message as not received by the server and will resend it in a loop. Moreover, the server should include in the message body the list of the IDs of accepted sensors along with the information, if the gateway should synchronize the measurements of these sensors with the server (ID of each sensor is sent by the gateway in the JSON in the "**response_handle**" field. Response body:

```
{
"Y": [number], // IDs of sensors, which should be synchronised with the server
"N": [number] //  IDs of sensors, which should NOT be synchronised with the server
}
```

Example of the http response sent to the gateway:

```
{
"Y":[1,2,3],
"N":[4]
}
```

Heartbeat

ENDPOINT	/api/v2/gateways/heartbeat
METHOD	POST

HEADERS	`Content-Type: application/json`
	`charset=UTF-8`
	`X-Api-Token: <value of the "Organization Token" field>`

The HTTP request body contains information about Gateway's status in a JSON. Heartbeat messages are sent by the Gateway every 15 minutes.

```
{
   "name" : [string], // Name of the Gateway
   "model" : [string], // Model of the Gateway
   "software_version" : [string], // Software version
   "current_time" : [int], // Current time on the Gateway (Unix representation)
   "uptime" : [int], // Number of seconds since power up
   "mac" : [string], // MAC address
   "sensors_number" : [string], // number of sensors in the Gateway's range
   "next_communication_at" : [int], // Timestamp of the next communication
   "power_monitor" : {
      "is_usb_connected" : [boolean], // Information if the USB power adapter is connected
      "is_charging" : [boolean], // Information if the battery is charging
      "battery_level" : [int]l // Battery level in %. 'Null', if power supply is connected
   }
}
```

Example of a heartbeat message:

```
{
    "name": "Efento-Gateway-030A",
    "model": "HG6-v1.2-LECH",
    "software_version": "01.00.00-c723d",
    "current_time": 1731074192,
    "uptime": 2401,
    "mac": "28:2C:02:4F:03:0A",
    "sensors_number": "128/128",
    "next_communication_at": 1731075392,
    "power_monitor": {
        "is_usb_connected": true,
        "is_charging": true,
        "battery_level": null
    }
}
```

Troubleshooting

LED indicator guide

The Efento Gateway has four LEDs that display the device's status.

LED	Meaning
Blue - blinking	The gateway is in configuration mode and can be accessed via Bluetooth for setup.
Blue - constant	The gateway is operating normally.

Orange - constant	The gateway is powering on and has not yet connected to the network.
Green - blinking	The gateway is actively communicating with the server.
Red - blinking	Low battery warning (only if the power adapter is unplugged).
Red - constant	Error detected. Please contact support at help.efento.io for assistance.
All LEDs blinking sequentially	The gateway is restoring factory default settings.

Support

If you have any questions about the Efento Gateway or encounter issues during setup or operation, our support team is ready to assist you. Please visit help.efento.io to open a support ticket. To help us resolve your issue quickly, include information from the "Status" section (available in the mobile app) and a detailed description of the problem.

Qualification and approvals

European Union regulatory compliance

Information about European Union regulatory compliance for Efento Gateway is available in the Declaration of Conformity.

Compliance with the RoHS directive

Efento Gateway complies with the "Directive 2015/863/EU" (RoHS 3) of the European Parliament and the Council on the Restriction of Use of certain Hazardous Substances in Electrical and Electronic Equipment (RoHS).