



WM SYSTEMS WM-I3 Metering Modem User Manual

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WM SYSTEMS WM-I3 Metering Modem



Document specifications

This documentation was made for presenting the configuration steps of the LwM2M compatible operation and communication of the WM-I3® pulse counter / MBUS data collector and transmitter device.

Document Version:	REV 1.80
Hardware Type/Version:	User Manual WM-I3® metering modem – LwM2M settings
Hardware Version:	V 3.1
Bootloader Version:	V 1.81
Firmware Version:	V 1.10g
WM-E Term® configuration software version:	V 1.3.78
Pages:	18
Status:	Final
Created:	01-02-2023
Last Modified:	01-02-2023

Introduction

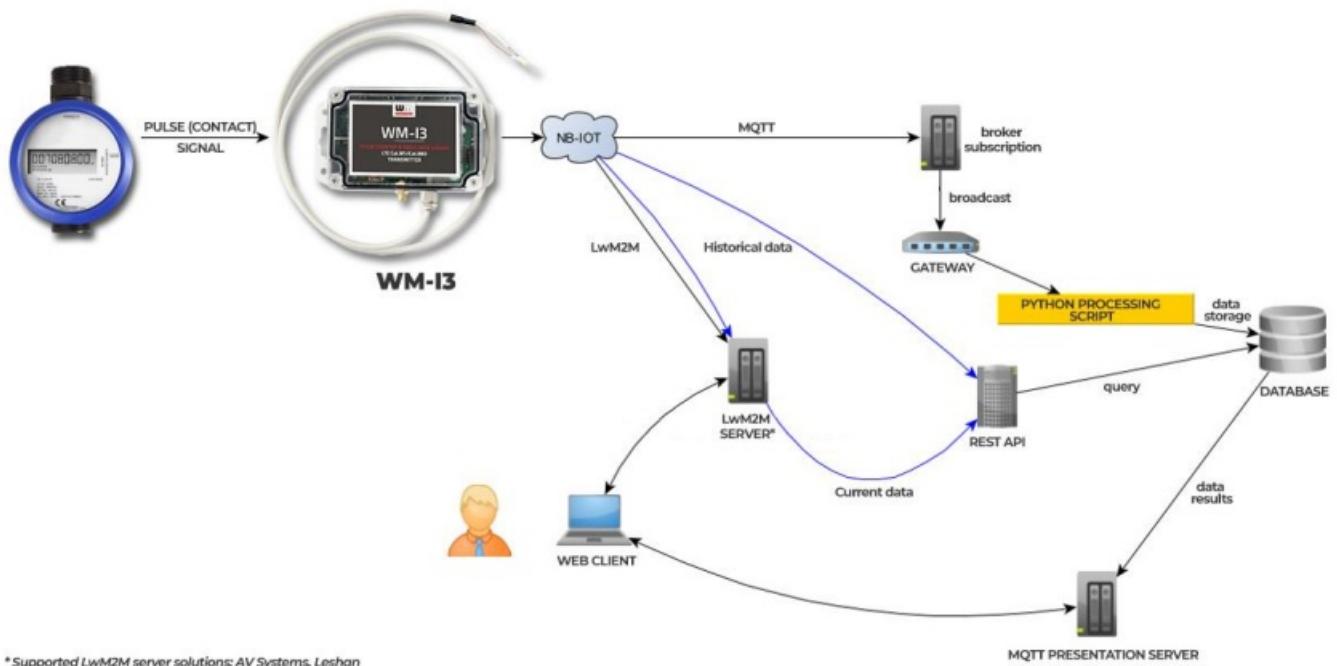
The WM-I3® is our 3rd generation low-power cellular pulse signal counter and data logger with a built-in cellular modem for smart water and gas metering.

Automated water meter readings with customizable breakdowns, leak detection and prevention. Detection of water leakages to avoid flooding, non-revenue water for more accurate billing, optimization of operating costs, and improvement of water supply reliability.

Remote data collection via pulse output (S0-type) or M-bus of the connected meter. Data is sent through LTE Cat.NB / Cat.M cellular networks to a central server or HES (Head-end System).

This smart water metering device has a standalone and intermittent operation.

It reads and counts the consumption data (pulse signals or M-Bus data) of the connected meters in „sleep mode” and saves the data to the local storage. Then it wakes up at pre-configured intervals to transmit the stored data using MQTT or LwM2M protocol, plain TCP/IP packets or JSON, XML format. Therefore, the device can be used with LwM2M communication.



Important!

This description contains only the required settings for the usage of the LwM2M protocol on the WM-I3. Any further settings of the device can be done by using the full User Manual of the WM-I3 device.

https://m2mserver.com/m2m-downloads/User_Manual_for_WM-I3_v1_80_EN.pdf

Modem Configuration

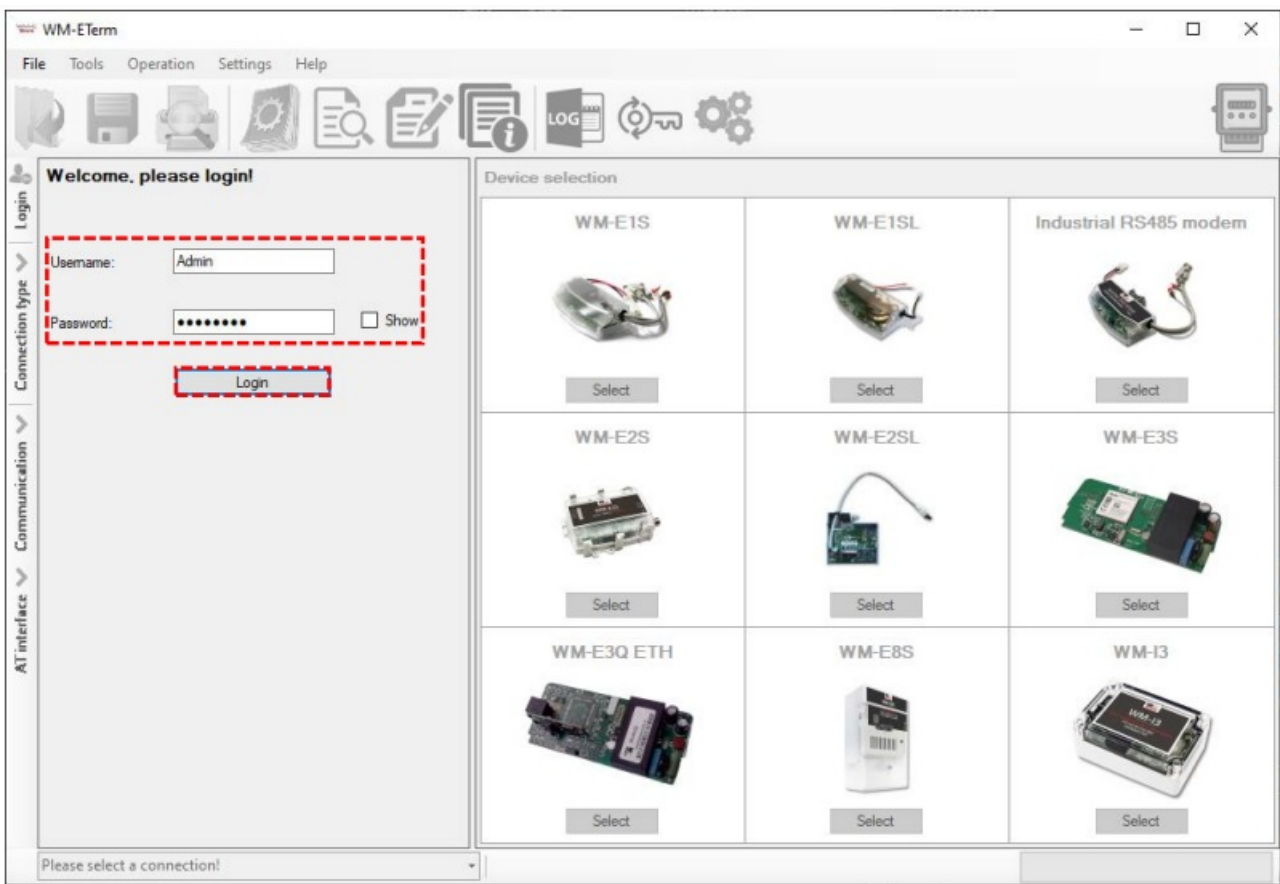
Configuring the device by the WM-E Term® software

#Step 1. Microsoft® .Net Framework v4 must be installed on your computer. In case of missing this component, you have to download it and install from the manufacturer's website: <https://www.microsoft.com/en-us/download/details.aspx?id=30653>

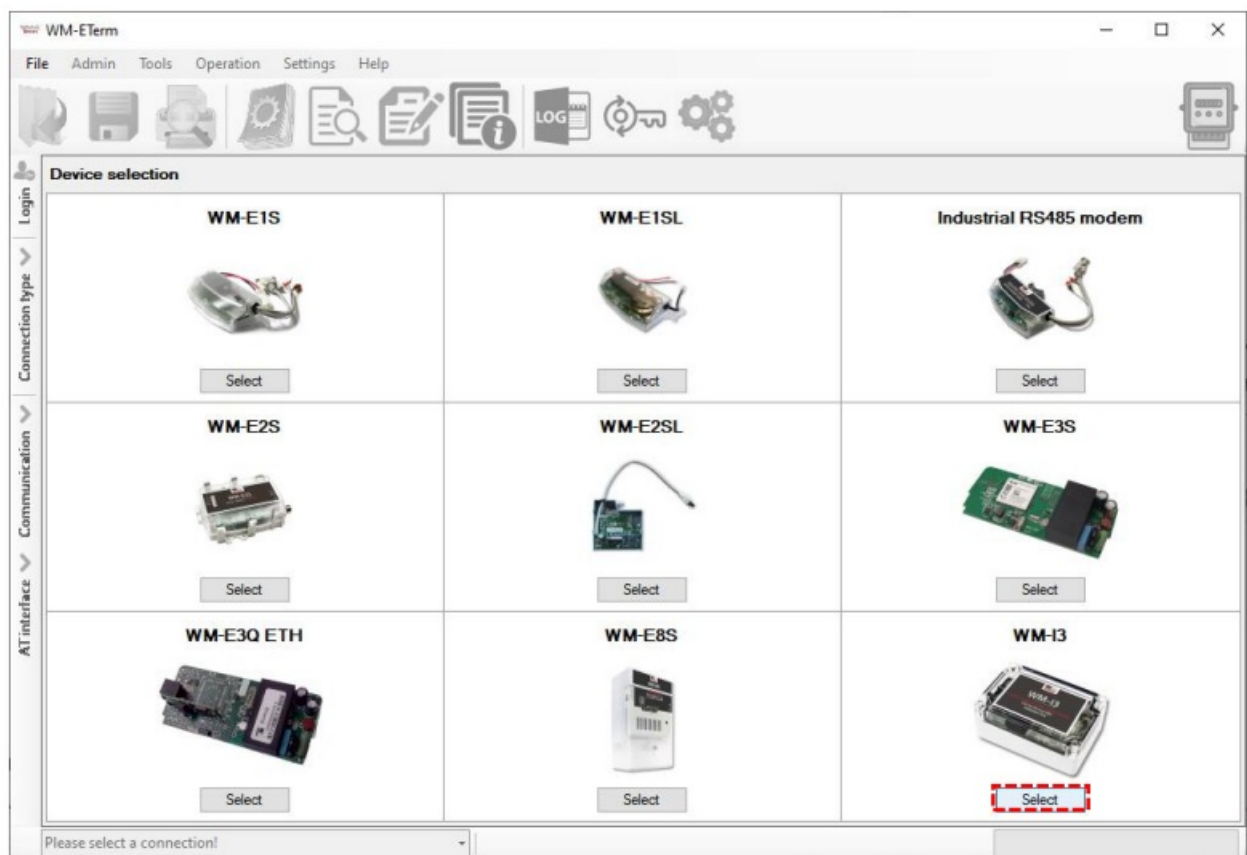
#Step 2. Download WM-E Term configuration software (Microsoft Windows® 7/8/10 compatible) by this URL: https://m2mserver.com/m2m-downloads/WM_ETerm_v1_3_78.zip

(You have to own administrator privileges for the directory where you are using the program.)

#Step 3. Unpack the downloaded .ZIP file into a directory, then start the configuration software by the [WM-ETerm.exe](#) file.



#Step 4. The configuration software will be started. Push to the Login button (leave the Username and Password fields as they are filled).



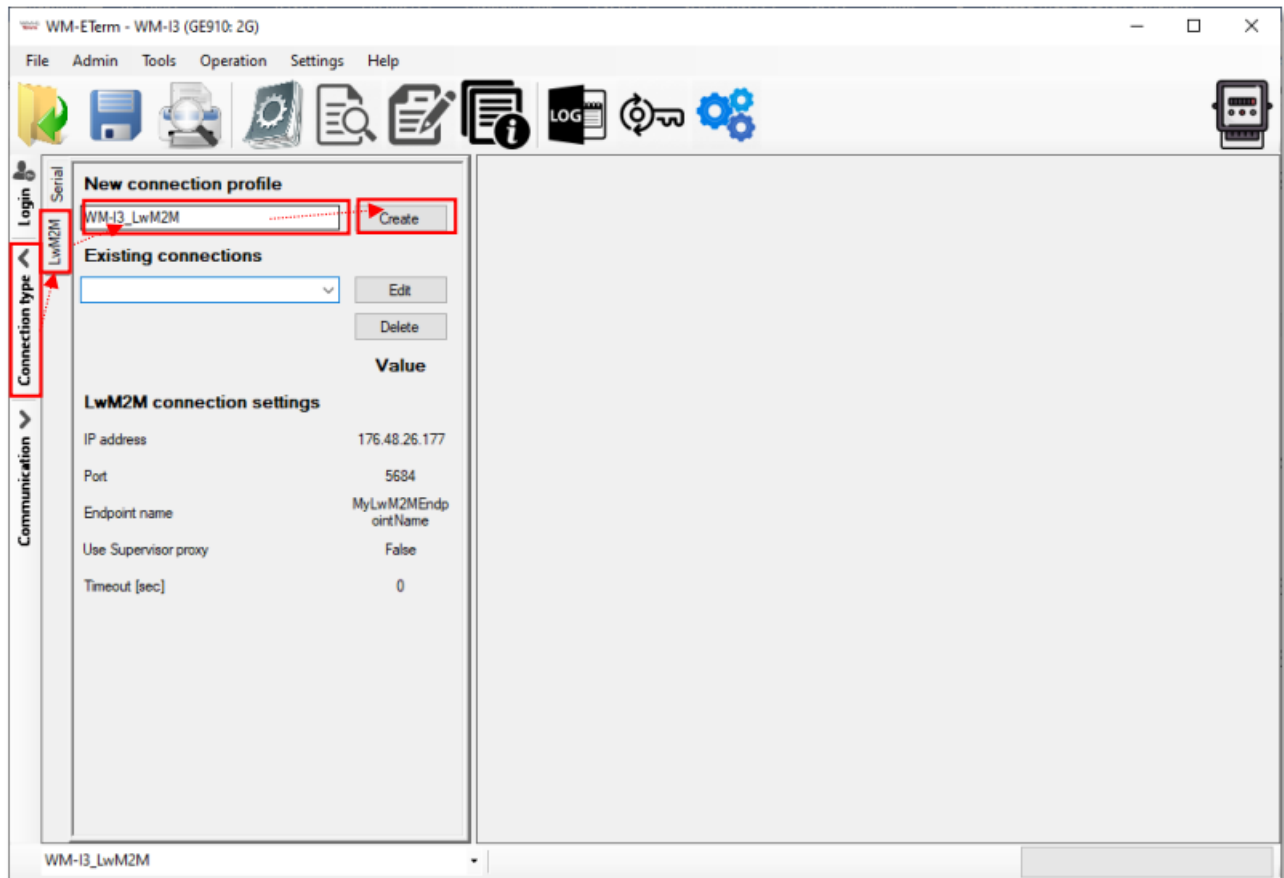
#Step 5. Then choose the Select button at the WM-I3 device.

Setup the device connection – Remote configuration via LwM2M protocol

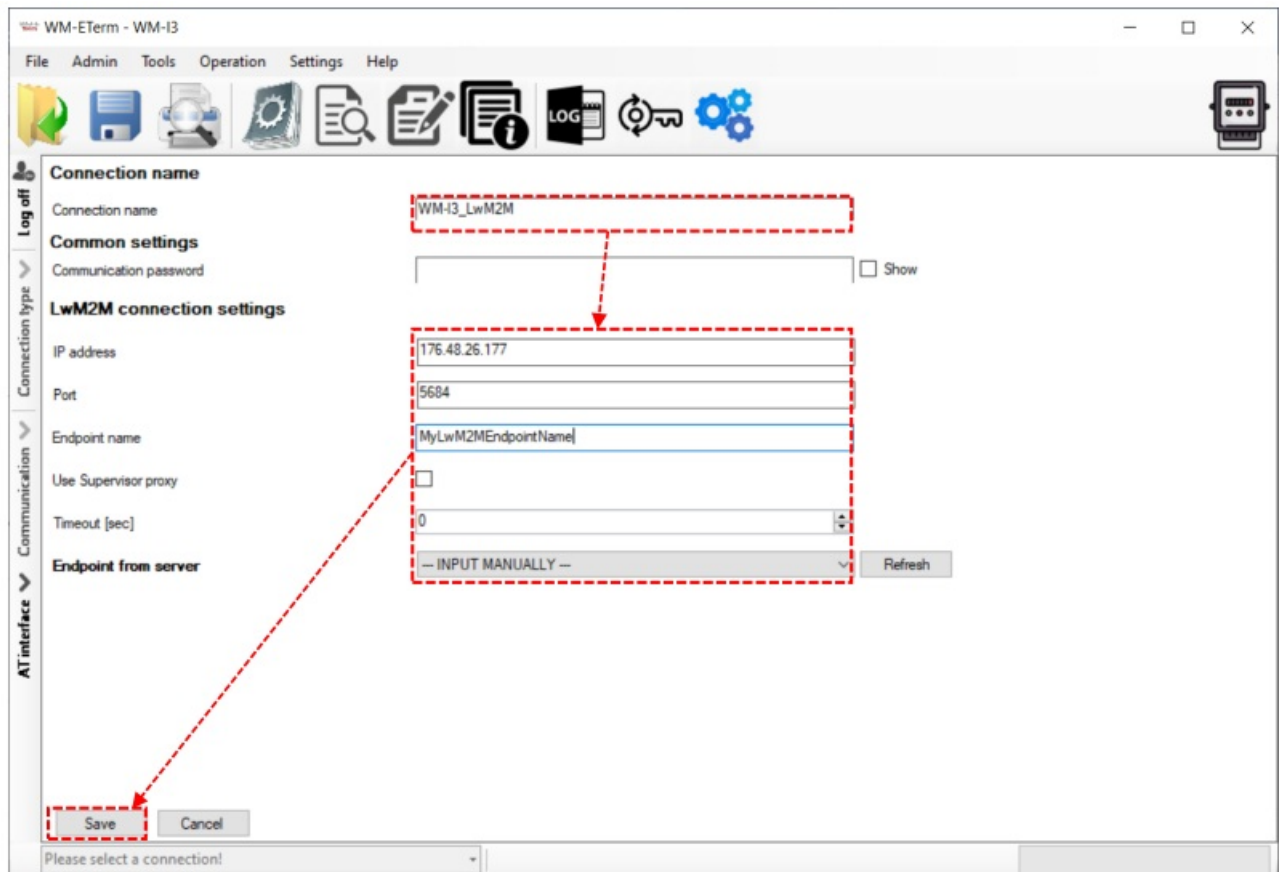
Important! Note that LwM2M server (Leshan Server or Leshan Bootstrap server or AV System's LwM2M server

solution) must be already installed and running and the server must be connected to the network, because the WM-I3 will try to connect to the LwM2M server during the connection configuration!

1. Choose the Connection type on the left side of the screen, then choose the LwM2M tab.
2. Add a New connection name for the profile then push the Create button.



3. Then the next window appears with the connection settings.



4. Add the IP address of the LwM2M server that you already installed. For the address server name can be also


used instead of IP address.

5. Also add the Port number of the LwM2M server here.
6. Add the Endpoint name of the WM-I3 device which you already configured at the LwM2M server side. The LwM2M server will communicate through this endpoint name.
This Endpoint name can be also requested and listed from the server if the device is already registered on the Leshan server.
7. You can enable the Use Supervisor proxy if you want, by the checkbox.
This is a unique Windows service and program, which can turn on and start the Leshan server. It is suitable for using it and communicate through this as a proxy.
Note, that if you want to use this, you have to add the LeshanSupervisor's address and its port number, and the WM-E Term software will communicate through this proxy with the Leshan server, and with the lwm2m endpoints (WM-I3 devices).
8. You can select Endpoint from server value or leave it on — INPUT MANUALLY — as it is default.
9. Click on the Save button to save the connection profile.

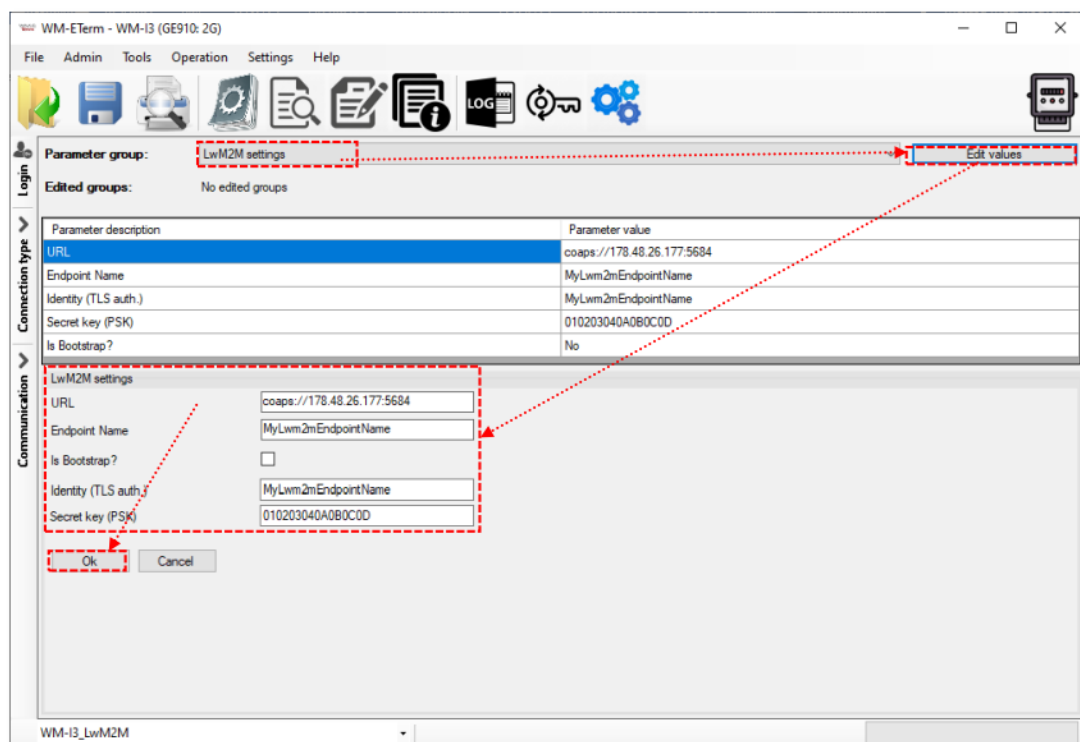
LwM2M parameter settings

Important! Note that the Leshan Server or Leshan Bootstrap server must be already installed, executed and connected to the network!

1. Download the sample WM-I3 configuration file:
https://m2mserver.com/m2m-downloads/WM-I3_Sample_Config.zip
2. For the first time configuration, let's Open the file in the WM-E Term software.

(If you already configured the device through LwM2M, you can use the Parameter read  icon the readout and to modify the settings).

3. Open the LwM2M settings parameter group.
4. Push to the Edit values button.



5. Modify the settings and add the Leshan server's URL (LwM2M server address).
The defined Lwm2m server URL can be a bootstrap server's address or an ordinary LwM2M server's address

(with a simple or encrypted communication). The URL defines the mode of communication – e.g. coap:// for general communication channel or coaps:// for the secured one. (In case of secure, the Identity and Secret key (PSK) fields must be also defined).

6. Add the Endpoint (WM-I3 device name), which you already configured at the Leshan server side. The LwM2M server will communicate through this endpoint name.

This Endpoint name can be also requested and listed from the server if the device is already registered on the Leshan server.

7. Configure the Is bootstrap feature, which means that the device is connecting to the bootstrap server (which creates a primary authentication and it decides with which lwm2m server should the device communicate with.).

After the successful bootstrap authentication, the bootstrap server sends the connection parameters for the endpoint device (such as server URL, Endpoint name, in case of an encrypted communication attempt – the Identity and Secret key (PSK) parameters also. Then the device will be registering to the server – which were getting during the bootstrap process – with the selected connection mode by the received parameters. During the registration (login to the LwM2M server) a second authentication takes place, and the device will appear as a registered endpoint. There is a re-registration lifespan (its value can be max. 86400 seconds), which controls the validity length of the device registration lifetime.

The two possible select options here:

- Is bootstrap (enabled feature): the bootstrap which is identifying the logging lwm2m devices, and it defines the communication way for the devices: it tells, that which server should be communicate with – then it sends the encryption key for the communication – if this server is available through an encrypted channel
- Not bootstrap (disabled feature): a simple server is providing LwM2M server features with ordinary or an encrypted communication

Both of this can be encrypted via DTLS protocol (UDP protocol based TLS).

8. Add the Identity name if you want, which is used for TLS authentication – and can be the same as the Endpoint name.
9. You also can add the Secret Key value here, which is the Pre-Shared Key (PSK) of the TLS in hexa format – e.g. 010203040A0B0C0D
10. Click on the OK button for saving the presets to the WM-E Term.

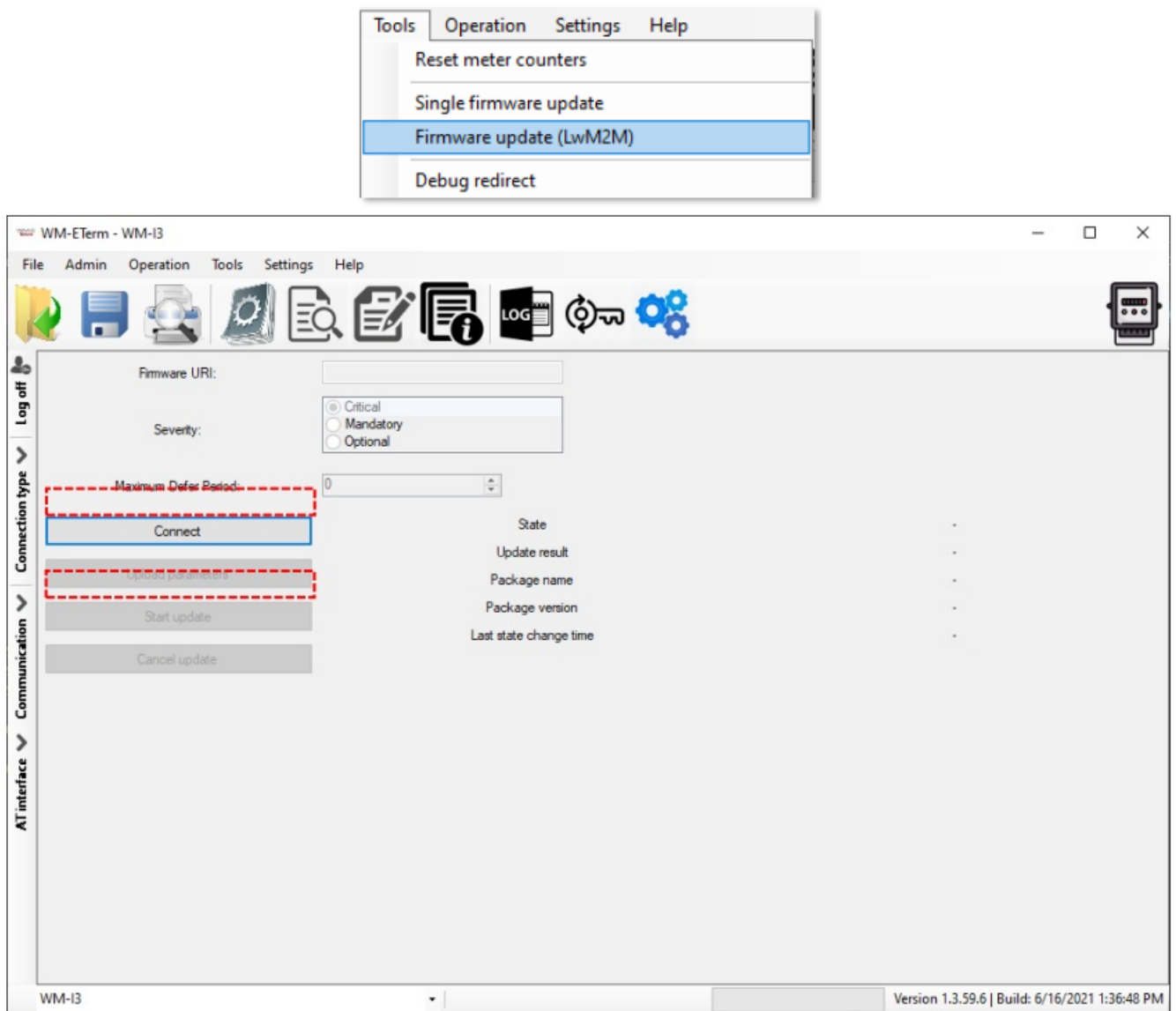
Important! Note, that in case of using the LwM2M, you need to choose the LwM2M protocol at every parameter group and settings.

Firmware update

Note that the Tools menu / Firmware update feature does not available yet. The firmware update works in LwM2M mode only.

1. Choose the the Tools menu / Firmware update (LwM2M) item.

Then the following window appears.



Note, that the LwM2M (Leshan) server must be executed and connected to the network!

2. Click on the Connect button and the fields will be changed to editable.
3. The Firmware URL contains the firmware download link, which is used by the device to download the firmware.
4. The severity is the priority.
5. The maximum defer period means the delay of the firmware installation.
6. Change the settings and click on the Upload the parameters button.
7. Begin the firmware update by pushing the Start update button.

Leshan LwM2M implementation

Our development is supporting two LwM2M solutions. This solution based on the Leshan Lwm2m server.

More information: <https://leshan.eclipseprojects.io/#/about>.

The Leshan's solution also supports the OMA Lwm2m v1.1 protocol.

Our LwM2M module supports the Lwm2m v1.0 protocol. In addition, we have defined our own objects and several standard objects.

If the Customer needs a server-side implementation or a service provider wants to use our product, of course a system integration will be necessary to perform. So, based on the requirements, we have to adapt our solution to the Lwm2m server version which is used by the Client. As it can be expected, this will require some development / testing resources and time.

The WM-E Term configuration software's Lwm2m expansion is entirely depending on Leshan, as it using its HTTP API to communicate with WM-I3 endpoint devices.

The communication channel looks like:

- WME-Term → Leshan Server → WM-I3 device

Using LwM2M protocol on Leshan server (CBOR format)

A demo LwM2M solution is currently being implemented on the WM-I3. The purpose of this is to demonstrate the operation of LwM2M-Leshan server.

If you have a specific request regarding the data format, please contact our Merchant!

For a public Leshan server you have to consider the following.

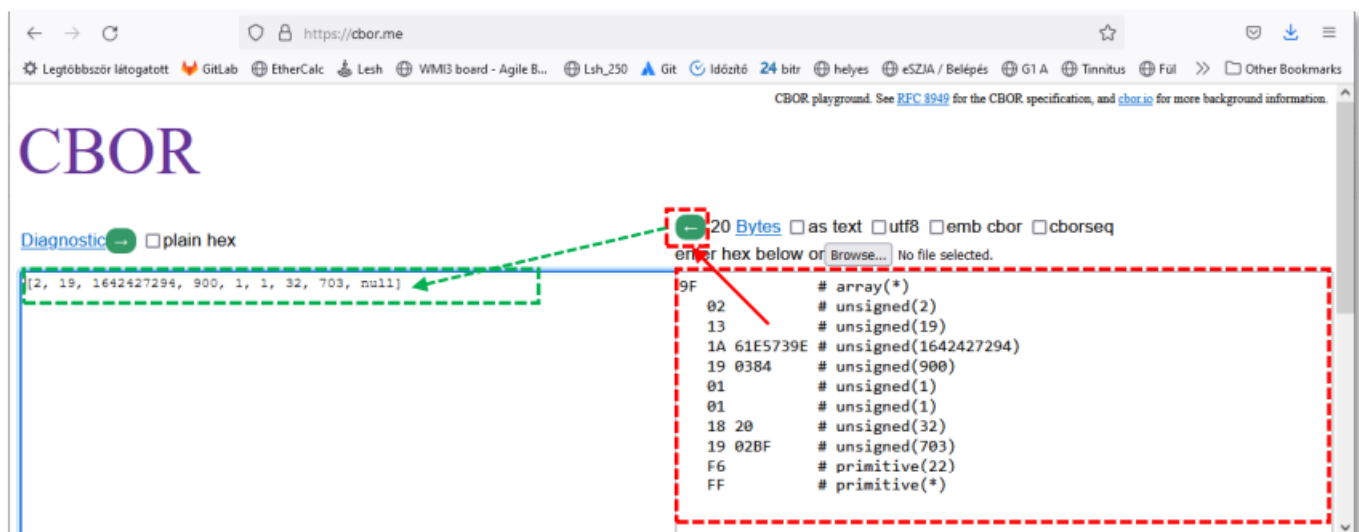
The data is encoded in CBOR format.

You will get some similar data using the objects during the data communication of the device (e.g. in our example let's see the Object 19 (BinaryAppDataContainer) which is stored in encoded format:

- 9f02131a61e5739e190384010118201902bff6ff
- 9f02131a61e57922190384020118201902c41902c4f6ff
- 9f02131a61e57d6d190384010118201902d1f6ff
- 9f02131a61e580f1190384010118201902ecf6ff
- 9f02131a61e5847419038401011820190310f6ff
- 9f02131a61e587f819038401011820190310f6ff
- 9f02131a61e58efe19038401011820190310f6ff
- 9f02131a61e592821903840101182019031af6ff

You should copy and paste a line to the right part of the CBOR's webpage screen, and press the left arrow button on the top of the right panel. Then the CBOR application will decode the content. You should repeat this from line-to-line.

CBOR application webpage: <https://cbor.me>



The meaning of the values:

1. Value 2 representing OMA-LwM2M CBOR format [8-bit integer]
2. Instance ID / Class per time interval [16-bit integer]
3. Timestamp of first Interval [32-bit integer] representing the number of seconds since Jan 1st, 1970 in the UTC time zone.
4. Data storage interval (period) in seconds [32-bit integer]
5. Number of intervals in Payload [16-bit integer]
6. Number of values to send per interval (period) [8-bit integer]
7. Size of Value 1 (pulse counted value) in bits [8-bit integer]

8. Value 1 (pulse counted value) in the current interval [x bits]

AV Systems LwM2M implementation

The other solution was made by the AV Systems' LwM2M server solution.

The necessary settings can be done locally by the WM-E Term configuration software or remotely with the Coiote Device Management interface of the AV Systems' software. More information:

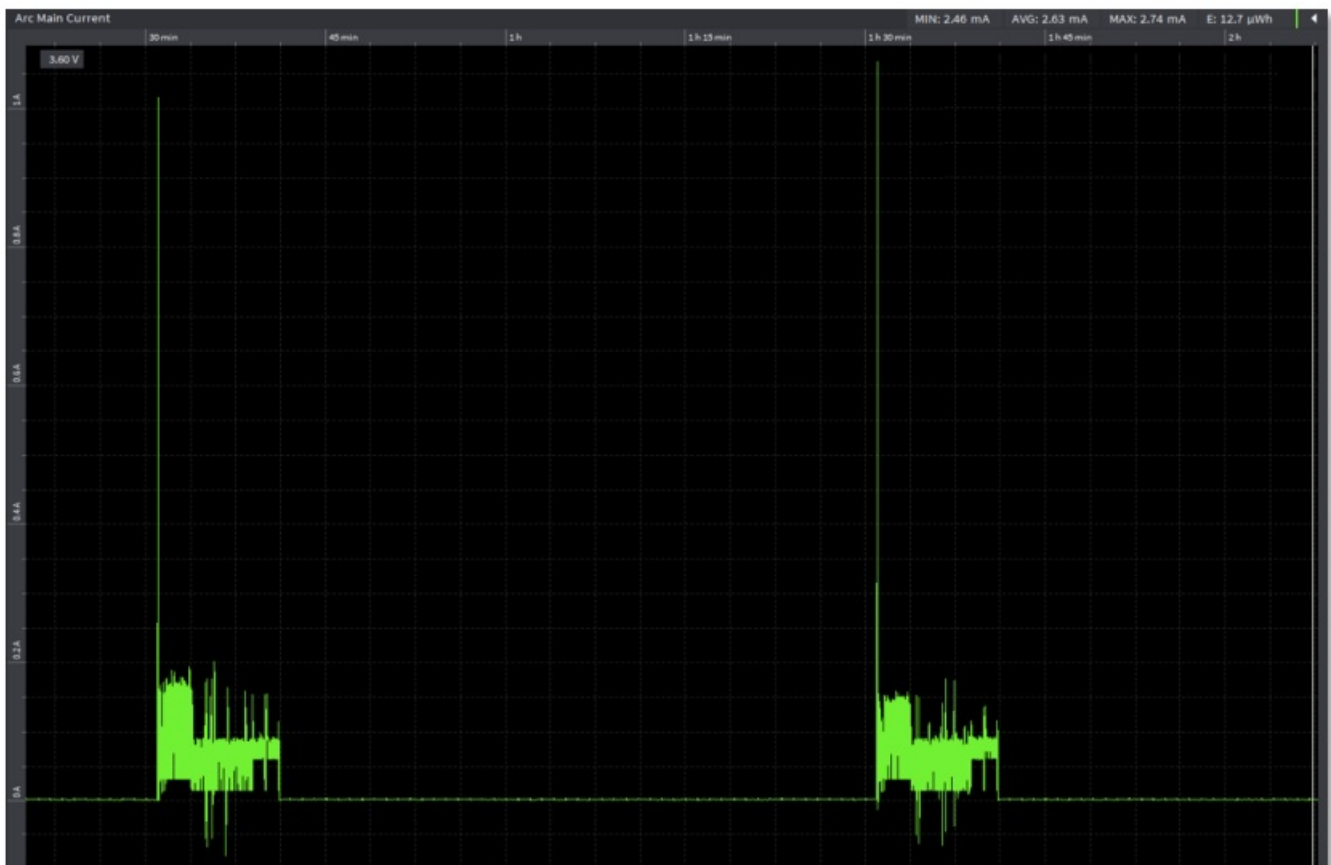
<https://www.avsystem.com/products/coiote-iot-device-management-platform/>

The screenshot displays the 'LwM2M-Test Coiote Device Management' web interface. At the top, a header bar shows 'PoC_WMSystems' and user controls. Below the header, a device card for 'wmi3-demo' provides details: Device ID, Serial number (000000001), Last uplink operation (Update 0m.43s ago), Lifetime (3m 0s), Manufacturer (WM Systems LLC), Firmware version (1.76), Model (WM-03 1.0a), Address (coaps://37.76.3355), Last downlink operation (Read 1m.38s ago), and Dialect (/lwm2m/default.sippt/checked). A left sidebar contains navigation links: Dashboard, Objects, Monitoring, Configuration, Actions, Device settings, Parameter tree, Device tasks, Logs, LwM2M firmware, and LwM2M software. The main content area shows a search bar and a list of settings for object 32771. The settings are as follows:

ID	Name	Value	Actions	Update time
1	Server IP address	broker.hivemq.com	<input checked="" type="checkbox"/> Value tracking <input type="checkbox"/> Attributes	2022.06.16 23:11:58
2	Server port	1883	<input checked="" type="checkbox"/> Value tracking <input type="checkbox"/> Attributes	2022.06.16 23:11:54
3	Data packet protocol	TCP	<input checked="" type="checkbox"/> Value tracking <input type="checkbox"/> Attributes	2022.06.16 23:11:51
4	Data sending interval [sec]	600	<input checked="" type="checkbox"/> Value tracking <input type="checkbox"/> Attributes	2022.06.16 23:11:57
5	Data sending retries	0	<input checked="" type="checkbox"/> Value tracking <input type="checkbox"/> Attributes	2022.06.16 23:11:56
6	Destination server protocol	MQTT	<input checked="" type="checkbox"/> Value tracking <input type="checkbox"/> Attributes	2022.06.16 23:11:59
7	Data storage frequency [sec]	60	<input checked="" type="checkbox"/> Value tracking <input type="checkbox"/> Attributes	2022.06.16 23:11:53
8	Data storage cycle counted by	true	<input checked="" type="checkbox"/> Value tracking <input type="checkbox"/> Attributes	2022.06.16 23:11:55
9	Data template	Show value	<input checked="" type="checkbox"/> Value tracking <input type="checkbox"/> Attributes	2022.06.16 23:11:50
10	Data protocol info	Show value	<input checked="" type="checkbox"/> Value tracking <input type="checkbox"/> Attributes	2022.06.16 23:11:52

Below the table, other settings for object 32774 (Life signal) and object 32775 (MBUS settings) are visible.

AV Systems Coiote Device Management configuration user interface



Incoming pulse signals

Support

If you have any questions concerning the usage of the device, contact us at the following contact:

E-mail: iotsupport@wmsystems.hu

Phone: +36 20 3331111

Online product support can be required here at our website: <https://www.m2mserver.com/en/support/>

For the proper identification of your device, use router sticker and its information, which contains important information for the call center.

Due to the support questions, the product identifier is important for resolve your problem. Please, when you are attempting to tell us an incident, please send us the IMEI and SN (serial number) information from the product warranty sticker (located on the front face of the product housing).

The documentation and software release for this product can be accessed by this link:

<https://m2mserver.com/en/product/wm-i3/>

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Warning

Any errors occurring during the program update process may result in failure of the device.


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- **Email:** sales@wmsystems.hu
- **Web:** www.wmsystems.hu

Documents / Resources

	<p>WM SYSTEMS WM-I3 Metering Modem [pdf] User Manual WM-I3 Metering Modem, WM-I3, Metering Modem, Modem</p>
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References

- [CBOR playground](#)
- [CBOR playground](#)

-  [leshan-server-demo](#)
- ^{M2M} [WATER METERING DEVICES Archives - WM Systems LLC - M2M / IoT Communication Solutions](#)
- ^{M2M} [LTE Cat.M1/NB2 Data Logger for Smart Water Metering - WM Systems LLC - M2M / IoT Communication Solutions](#)
-  [Scalable Coiot Iot Device Management Platform](#)
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