Application note 1

How to pair sensors using an XML file

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1. Introduction

This application note describes how to quickly pair LoRaWAN sensors that you want to attach to the concentrator using an XML configuration file with the internal LoRaWAN server.

2. Prerequisite

The webdynEasy LoRaWAN must be configured and be able to connect to the remote server. (see "WebdynEasy LoRaWAN_UserManual.pdf" user manual section 5: "Configuration")

3. Internal LoRaWAN server configuration

By default, the webdynEasy LoRaWAN is configured in internal server mode.

The built-in LoRaWAN server manages the LoRaWAN sensors as a private network. It includes all the LoRaWAN V1.0.2 network functions (gateway, LoRaWAN server and application server). All received data is stored in files and all available data is uploaded each time there is a connection to the remote server.

4. Adding sensors using an XML file

Create or retrieve an XML file called:

"<uid>.xml"

Where:

- <uid>: Concentrator identifier

    The XML configuration file uploaded by the concentrator to the CONFIG directory on the remote server can be retrieved.

    For an XML file creation, the file name is free format.

Edit the XML file

The internal LoRaWAN server only supports class A and the 2 following activation modes:

- ABP (Activation By Personalization)

- OTAA (Over The Air Activation)

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- If the sensor is in ABP mode, enter the DevAddr, NwkSKey and AppSKey parameters:

```
<config>
      <uid>00AABB</uid>
      <lorawan>
            <server>
                  <modules>
                        <module>
                              <devaddr>00471001</devaddr>
                              <appskey>B0F622CF1C7B7C427ED77A3B63CFCEA3</appskey>
                              <nwkskey>F47E831F180932A21F8A69814CB54A82</nwkskey>
                        </module>
                  </modules>
            </server>
      </lorawan>
</config>
```

- If the sensor is in OTAA mode, enter the DevEUI and AppKey parameters:

```
<config>
      <uid>00AABB</uid>
      <lorawan>
            <server>
                  <modules>
                        <module>
                              <devaddr>00471001</devaddr>
                              <appskey>B0F622CF1C7B7C427ED77A3B63CFCEA3</appskey>
                              <nwkskey>F47E831F180932A21F8A69814CB54A82</nwkskey>
                        </module>
                  </modules>
            </server>
      </lorawan>
</config>
```

⚠️ The sensor parameters are provided by the sensor manufacturer.

- To pair a new sensor, simply add a new "module" tag.

Example of an XML file containing several sensors:

```
<config>
        <uid>00AABB</uid>
        <lorawan>
                <server>
                        <modules>
                                <module>
                                        <devaddr>00471001</devaddr>
                                        <appskey>B0F622CF1C7B7C427ED77A3B63CFCEA3</appskey>
                                        <nwkskey>F47E831F180932A21F8A69814CB54A82</nwkskey>
                                </module>
                                <module>
                                        <deveui>0005f30000000295</deveui>
                                        <appkey>289a973741473e3a9b391f65c2b127a3</appkey>
                                </module>
                                <module>
                                        <deveui>0005f30000000296</deveui>
                                        <appkey>a9b391f65c2b127a3289a973741473e3</appkey>
                                </module>
                        </modules>
                </server>
        </lorawan>
</config>
```

⚠️ There is no need to send the entire configuration back to your concentrator. A configuration file can be partial if the variable is not part of a list. You can therefore send a configuration file containing only the complete list of sensors.

Sending the configuration file

This can be done locally on the web interface, or remotely using the "INBOX" directory on the server.

Locally: On the "Actions" tab, select the required configuration file using the "File Upload" form, then validate the selection by clicking the "Upload" button. The file will be sent to the concentrator and applied.

Remotely: Upload the configuration file to the "INBOX" directory on your concentrator ("INBOX/<uid>/", where <uid> is your concentrator identifier). On the next connection to the remote server, the concentrator will carry out 4 steps:

- Upload of the files from the concentrator to the server if the configuration is different or data is available.

- Download of the configuration file available on the server.

- Deletion of the server configuration file.

- Application of the new configuration.
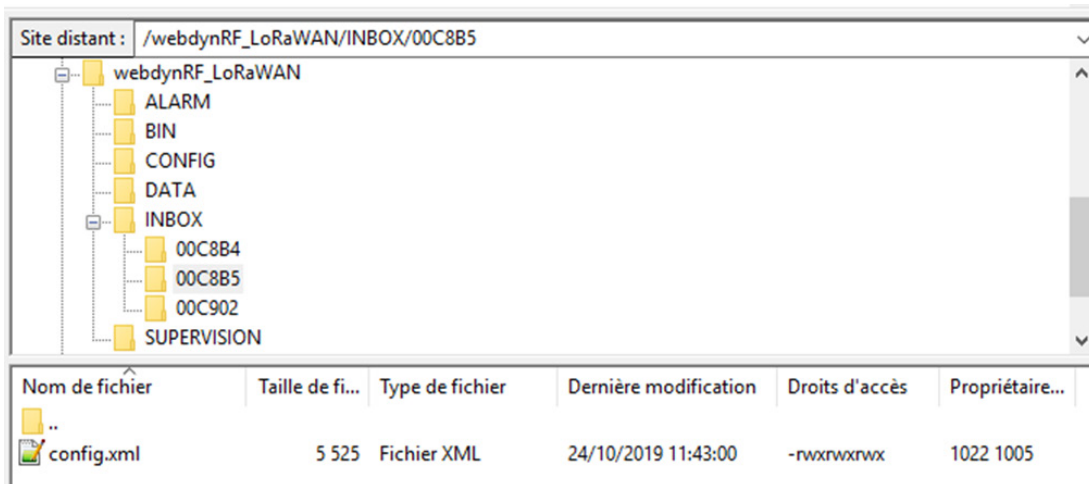
5. Sensor operation

Start the LoRaWAN sensor. (see sensor user manual)

If the sensor is in OTAA mode, the AppSKey and NwkSKey keys are generated and saved at JOIN time. It is possible to check the sensor pairing to the concentrator by checking the presence of the AppSKey and NwkSKey in the configuration file in the remote server CONFIG directory.

Excerpt from an example of an XML configuration file:

```xml
<config>
      <uid>00AABB</uid>
      ...
            <server>
                  <netid>23880</netid>
                  <adr>
                        <enable>true</enable>
                        <margin_db>5</margin_db>
                        <uplink_count>20</uplink_count>
                  </adr>
                  <udp_port>1700</udp_port>
                  <backup_interval>86400</backup_interval>
                  <modules>
                        <module>
                              <deveui>0005f30000000295</deveui>
                              <appkey>289a973741473e3a9b391f65c2b127a3</appkey>
                              <devaddr>00471001</devaddr>
                              <appskey>B0F622CF1C7B7C427ED77A3B63CFCEA3</appskey>
                              <nwkskey>F47E831F180932A21F8A69814CB54A82</nwkskey>
                              <fcntup>0</fcntup>
                              <fcntdown>0</fcntdown>
                        </module>
                  </modules>
            </server>
      </lorawan>
</config>
```

It is also possible to check the data file uploads in the DATA directory on the remote server.

Example of a JSON data file:

```
{
      "uid": "010471",
      "data": [
            {
                  "type": "lora",
                  "date": "2021-12-09T15:10:45",
                  "deveui": "0005f30000000295",
                  "devaddr": "00471001",
                  "rxinfo": {
                        "gatewayuid": "0005f3fffe010471",
                        "freq": "868.1",
                        "datr": "SF12BW125",
                        "codr": "4/5",
                        "rssi": "-20",
                        "lsnr": "7.2"
                  },
                  "fcnt": "2",
                  "fport": "1",
                  "records": [
                        {
                              "type": "raw_hex",
                              "data": "810005F300000002950047100100010101"
                        }
                  ]
            }
      ]
}
```

The data file contains the data sent from the sensors, but also important information such as the RSSI, which shows the sensor reception power level.