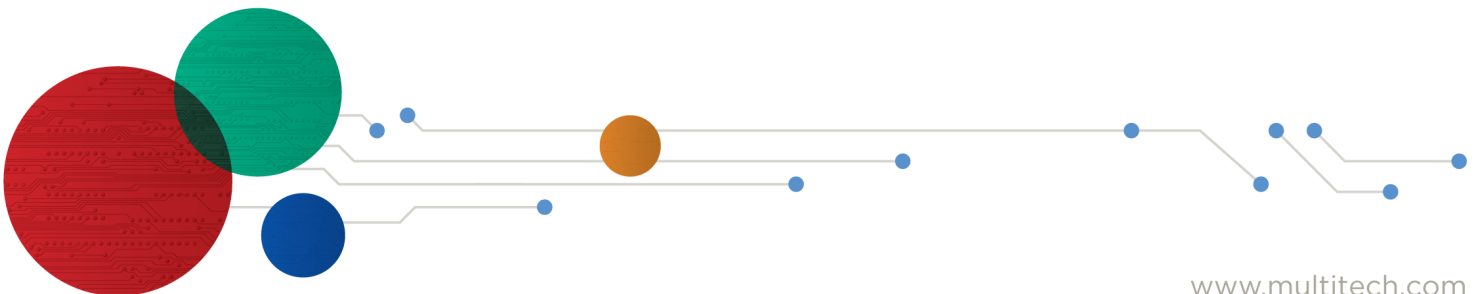


Adding Custom Decoders and Sensor Definitions to BACnet

Reference Guide



Adding Custom Decoders and Sensor Definitions to BACnet

Part Number: S000825 Rev. 1.0

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Contents

1 – Adding Custom Decoders and Sensor Definitions to BACnet	4
Introduction	4
Requirements.....	4
Downloading a JavaScript Decoder from the TTN Repository.....	4
Creating a Sensor Definitions File	5
Uploading the Sensor Decoder and Definitions Files.....	7
Troubleshooting Sensor Definitions and Decoders From the UI	8
Testing Decoders Through SSH	8
2 – Revision History	9

1 – Adding Custom Decoders and Sensor Definitions to BACnet

Introduction

By default, the system supports MultiTech/Radio Bridge, Adeunis, and Elsys LoRaWAN sensors. The following are embedded into the firmware and cannot be modified or deleted by the user:

- Sensor definitions
- A sensor definition JSON file
- A sensor decoder file

This reference guide explains how to import sensor definitions, which allows adding new sensors or importing a custom sensor definition.

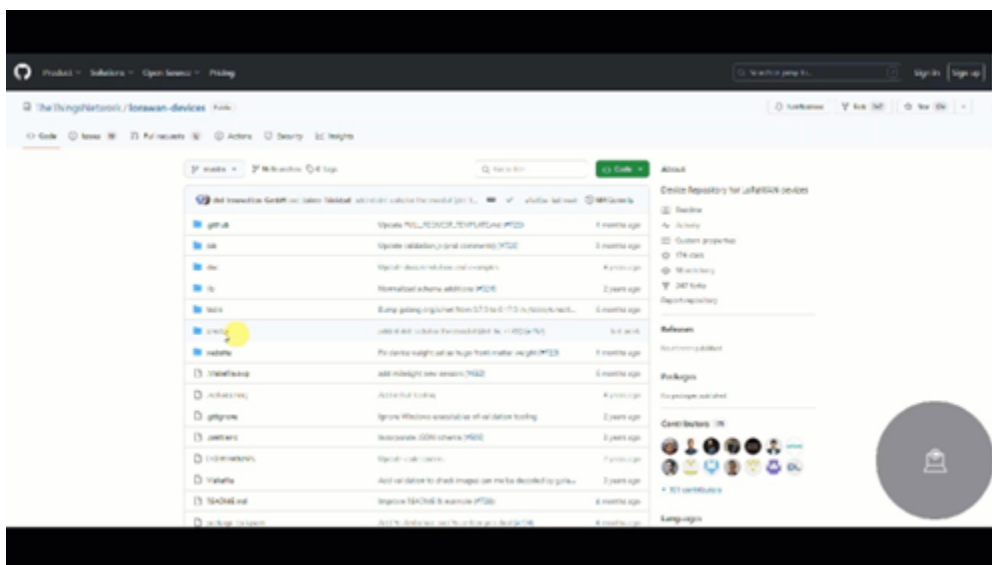
Requirements

- MultiTech Gateway with Payload Management License with mPower 6.3.2 or higher.
- LoRaWAN sensor with JavaScript decoder.
- A Conduit gateway with mPower OS v6.3.2 or higher that has been optimized to use the standard of TTN JavaScript decoders from their device repository located in [GitHub](#).

Downloading a JavaScript Decoder from the TTN Repository

If your sensor is included in the device repository you can download the decoder from the TTN GitHub and use that decoder to create a sensor definition file. Complete these steps:

1. Go to the [device repository](#), find your sensor manufacturer and model, and download the file.
2. MultiTech/Radio Bridge Sensor decoders are pre-installed on our devices. You can use [radio_bridge_packet_decoder.js](#) if you need to modify it.



```
function decodeUplink(input) {
  try{
    var bytes = input.bytes;
    var data = {};
    const toBool = value => value == '1';
    var calculateTemperature = function (rawData){return
    (rawData - 400) / 10};
    var calculateHumidity = function(rawData){return (rawData *
    100) / 256};
    var decbin = function (number) {
    if (number < 0) {
      number = 0xFFFFFFFF + number + 1
    }
    number = number.toString(2);
    return "00000000".substr(number.length) + number;
  }
  function handleKeepalive(bytes, data){
    var tempHex = '0' + bytes[1].toString(16) +
    bytes[2].toString(16);
    var tempDec = parseInt(tempHex, 16);
    var temperatureValue =
    calculateTemperature(tempDec);
    var humidityValue =
    calculateHumidity(bytes[3]);
    var batteryHex = '0' +
    bytes[4].toString(16) + bytes[5].toString(16);
    var batteryVoltageCalculated = parseInt(batteryHex,
```

Creating a Sensor Definitions File

After downloading your JavaScript decoder either from the TTN repository or directly from the sensor manufacturer, create a sensor definitions file. This is a JSON file that defines all the data types that the decoder reads from the sensor.

This example uses the mClimate CO2 Display decoder downloaded from the [Downloading a JavaScript Decoder from the TTN Repository](#) section.

1. From the code snippet in the [previous](#) section, note the sections where the function returns **data**. These are the specific data points that are added to our sensor definitions file.

This is the JSON sensor definitions file created for the CO2 Display sensor:

```

{
  "description" : "Temperature Sensor",
  "properties" : {
    "DeviceType"           : {"type" : "uint8"},
    "HardwareVersion"      : {"type" : "uint8"},
    "FirmwareVersion"     : {"type" : "uint16"},

    "BatteryLevel"         : {"type" : "float",      "units" : "volts"},
    "AccumulationCount"    : {"type" : "uint16"},
    "TamperSinceLastReset" : {"type" : "bool"},
    "CurrentTamperState"   : {"type" : "bool"},
    "ErrorWithLastDownlink" : {"type" : "bool"},
    "BatteryLow"           : {"type" : "bool"},
    "RadioCommError"      : {"type" : "bool"},

    "TamperState"         : {"type" : "bool"},

    "CurrentSubBand"      : {"type" : "uint8"},
    "RSSILastDownlink"    : {"type" : "int8"},
    "SNRLastDownlink"     : {"type" : "int8"},

    "TemperatureEvent"    : {"type" : "uint8"},
    "CurrentTemperature"   : {"type" : "int8",      "units" : "celsius"},
    "RelativeMeasurement" : {"type" : "int8"}
  },
  "decoder": "radiobridge-decoder.js"
}

```

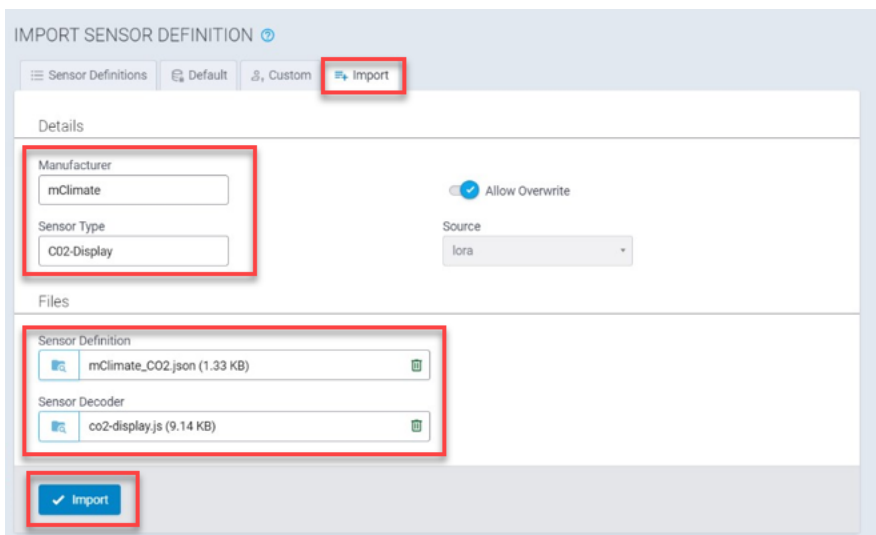
2. Sensor definitions require these objects:
 - **description:** A description of the sensor.
 - **properties:** A list of all the properties the sensor returns including their name, type, and units if applicable.
 - **decoder:** The name of the JavaScript decoder file.
3. Ensure the following when creating the sensor definitions file:
 - a. The name of the properties must match the spelling and case of the name in the decoder.
 - b. Ensure the data type returned corresponds to the decoder file. For example, if you list **data.hardwareVersion** as a float, make sure that in the decoder that value is a number. You may have to adjust your decoder.
 - c. The decoder name must match the file name of the JavaScript decoder.

Uploading the Sensor Decoder and Definitions Files

1. Select **Payload Management > Sensor Definitions**.

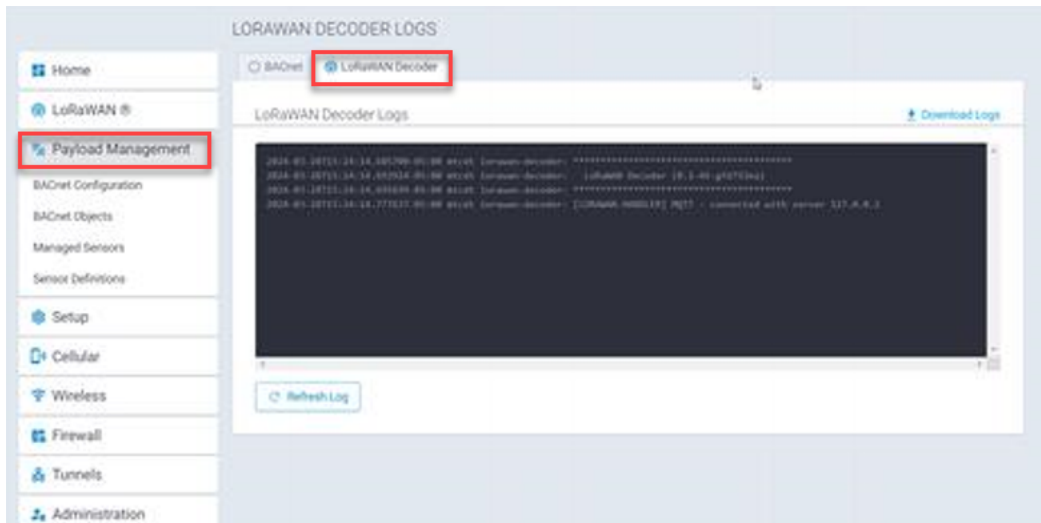


2. Go to the **Import** tab.
3. Enter the Manufacturer and Sensor Type.
4. Choose the **Sensor Definition** and **Sensor Decoder** files from your machine.
5. Click **Import**.



Troubleshooting Sensor Definitions and Decoders From the UI

Error messages from the Payload Decoder can be found under **Status & Logs > Payload Management** under the LoRaWAN Decoder.



Testing Decoders Through SSH

If you have the programming experience, you can test the decoders directly on the operating system of the gateway:

1. Enable SSH by selecting **Administration > Access Configuration**.
2. SSH into the gateway.
3. Go to the `/var/config/scada/sensors/` directory to access the custom decoder files.
4. Run the following command to test the decoder directly. Ensure that you test before uploading the decoder onto the device.

```
admin@mtcdt:~$ packet-decoder-cli \
  --js-uplink-decoder c02-didplay.js \
  --port 1 \ --packet 0102A33E0BE01A00000000 \
  --stdout
```

2 – Revision History

Revision Number	Description
1.0	Initial release. June 2024