Ruuvi sensor application brief

This document is a shorter version of the application note available for Licensees under the Application SDK.

Introduction

This application serves as an example on how to transport sensor data on top of Wirepas Mesh (WM) network and is designed for use with Ruuvi Tags.

This application must run on a Ruuvi tag due to the sensors it interacts with. Apart from that, the application relies on WM single MCU primitives which follow the radio and platform agnostic philosophy of WM.

Functional overview

This application queries measurements from sensors (environmental and accelerometer) on Ruuvi boards and sends them at regular intervals toward the Sink.

Data sent to the Sink is encoded as Type Length Value (TLV) format. This application decides which sensors to read based on the configuration present in the AppConfig.

Application datagrams

On each reading period, the application sends active sensor measurements towards the Sink. Packets are sent from endpoint 11 to endpoint 11.

The APDU is a succession of sensors measurement formated to TLV format. The sensor data is only present in the payload if it has been enabled through the configuration.

The formated data looks like this :

```
[Type - 1byte]      [Length -  1byte] [Value - N bytes little endian]
[0x01: Counter]     [0x02]            [uint16_t counter]
[0x02: Temperature] [0x04]            [int32_t  temperature]
[0x03: Humidity]    [0x04]            [uint32_t humidity]
[0x04: Pressure]    [0x04]            [uint32_t pressure]
[0x05: Accel X]     [0x04]            [int32_t  accel X]
[0x06: Accel Y]     [0x04]            [int32_t  accel Y]
[0x07: Accel Z]     [0x04]            [int32_t  accel Z]
```

The sensors range and format are the following:

```
Counter : [0-65535], incremented by 1 each period.
Temperature : [-40;+85°C], 1LSB is 0.01°C in 2's complement.
Humidity : [0;100%], 1LSB is 1/1024 % of relative humidity (1% is 1024).
Pressure : [300;1100 hPa], 1LSB is 0.01 Pascal.
Accel on X axis : [-2g;+2g], 1LSB is 1mg in 2's complement.
Accel on Y axis : [-2g;+2g], 1LSB is 1mg in 2's complement.
Accel on Z axis : [-2g;+2g], 1LSB is 1mg in 2's complement.
```

For example, if only temperature and acceleration on X axis are enabled, the payload will look like this :

```
[0x01][0x02][Counter 2Bytes][0x02][0x04][Temp 4Bytes][0x05][0x04][X accel 4Bytes]
```

Application configuration

By default the application is configured to send the measurement off all sensors every 10 seconds. This can be configured using the AppConfig mechanism offered by the Wirepas stack.

The AppConfig commands are formated using TLV format. Any combination of valid commands can be added to the AppConfig payload.

Selecting sensor data - SENSORS_ENABLE

Each sensor can be enabled/disabled individually through the SENSORS_ENABLE command. If a sensor is disabled it does not appear in the data measurement ADPU.

The SENSORS_ENABLE command has the following format :

```
[Type - 1byte] [Length - 1byte] [Value - 6bytes]
[0x01]         [0x06]           [Temp][Humi][Press][Acc X][Acc Y][Acc Z]
```

Value 1 enables the sensor; Value 0 disables it.

For example to enable the 3 accelerometer axis and disable other sensors, the SENSORS_ENABLE command will look like this:

```
[Type - 1byte] [Length -  1byte] [Value - 6bytes]
[0x01]         [0x06]            [0x00][0x00][0x00][0x01][0x01][0x01]
```

Modifying sensor rate - SENSORS_PERIOD

The SENSORS_PERIOD command can be used to configure at what rate sensors measurement are made and data sent towards the Sink.

The SENSORS_PERIOD command has the following format :

```
[Type - 1byte] [Length - 1byte] [Value - 1-2 bytes]
[0x02]         [0x01 or 0x02]   [sensor rate (little endian)]
```

For example to set the sensors rate to 5 minutes, the SENSORS_PERIOD command will look like this:

```
[Type - 1byte] [Length -  1byte] [Value - 2 bytes]
[0x02]         [0x02]            [0x2C][0x01]
```

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