

RuuviTag Configuration

Introduction

RuuviTags are configured via BLE GATT connection, using Nordic UART Service NUS. Data packets have format of header + payload, where header has 4 bytes: source, destination, type, length of payload.

Source can be anything, configuration packages are acknowledged by the application. The acknowledgement will have source set as the destination of previous configuration and destination set as the source of previous packet.

Destination tells the application how the incoming data should be processed.

Type should always be **0x02**, *actuator configuration* when tag is being configured or **0x04**, *status_query* when current configuration is being queried. Acknowledgements for configuration and query commands have always type of **0x03**, *acknowledgement*.

Payload length is the number of bytes in payload. The payload of acknowledgement of the sensor has same length as the configuration message, and it should be all zeroes on configuration. Any non-zero code in configuration reply payload is an error code. In case there is an error from configuration, invalid setting will not take effect but valid settings will be applied.

Error codes are listed in appendix one.

For added security, before any configuration commands or command to enter bootloader is accepted, application must enter valid configuration code via NUS.

List of configuration commands

| Parameter | Header | Payload | Reply |
|---|-------------|--|----------------------------|
| iBeacon UUID | XX F0 02 16 | UUID, 16 bytes | F0 XX 03 10 [16 bytes 00] |
| iBeacon Major, Minor, RX | XX F1 02 05 | Major U16, Minor U16, received power I8 | F1 XX 03 05 [5 bytes 00] |
| iBeacon interval, sensor data interval, no-activity sleep, BLE TX power | XX F2 02 07 | iBeacon interval, U16, ms Sensor data interval, U16, ms, 0x00 to disable, non zero to enable sleep timer in seconds., TX PWR, dBm, i8 | F2 XX 03 07 [7 bytes 00] |
| Unlock | XX F3 02 16 | Passcode, 16 bytes | F3 XX 03 16 [16 bytes 00] |
| | | | |

XX: Don't care

iBeacon payload: 16 bytes, UUID used in application.

iBeacon Major, minor, RX: 2 bytes for Major and Minor, int8_t for RX power at 1m.

iBeacon interval, sensor data interval, no-activity sleep: intervals in milliseconds, valid range 100 - 10 000 (however total min tx rate is 100 ms. 0 To disable transmission.

Time of inactivity before sleep in seconds, valid range 1 . 65534. 0 To disable sleep timer.

Example configuration sequence is listed in appendix two.

Appendix 1: List of error codes

```
ENDPOINT_SUCCESS      = 0, // ok
ENDPOINT_NOT_IMPLEMENTED = 1, // not implemented yet
ENDPOINT_UNKNOWN      = 2, // unknown parameter
ENDPOINT_NOT_SUPPORTED = 4, // not supported
ENDPOINT_INVALID       = 8, // Invalid parameter for some reason
ENDPOINT_HANDLER_ERROR = 16 // Error in data handler
```

Appendix 2: Example configuration sequence

Example below establishes connection and unlocks the beacon. Following configuration is applied:

Unlock code: 0x00 01 02 03 04 05 06 07 08 09 0A 0B 0C 0D 0E 0F

iBeacon UUID: 0x0F 0E 0D 0C 0B 0A 09 08 07 06 05 04 03 02 01 00

iBeacon Major: 0x12 34

iBeacon Minor 0x00 01

iBeacon RX power at 1 m: -40 dBm

iBeacon interval: 500 ms

Sensor data interval: 5240 ms

Sleep when no activity: Disabled

TX pwr: +4dBm

Additionally all values are read back from the device to confirm that configuration has been successful.

All values are in hex.

[illegible]

| Actor | Header | Payload | Action |
|------------|-----------------|--|---|
| RuuviTag | 0xF0 81 03 16 | 0F 0E 0D 0C 0B 0A 09 08 07 06 05 04 03 02 01 00 | REPLY UUID |
| Smartphone | 0x80 F1 02 05 | 12 34 00 01 A8 | MAJOR ID, MINOR ID, RX PWR |
| RuuviTag | 0xF1 80 03 05 | 00 00 00 00 00 | MAJOR, MINOR, PWR OK |
| Smartphone | 0x81 F2 04 05 | 00 00 00 00 00 | READ MAJOR, MINOR, PWR |
| RuuviTag | 0xF1 81 03 05 | 12 34 00 01 A8 | REPLY MAJOR, MINOR, PWR |
| Smartphone | 0x80 F2 02 07 | 01 F2 05 00 00 00 04 | SET TX INTERVALS, SLEEP TIMER, TX PWR |
| RuuviTag | 0xF2 0x80 03 07 | 00 00 00 00 00 00 00 | TX INTERVALS, SLEEP TIMER, TX PWR OK |
| Smartphone | 0x81 F2 04 07 | 00 00 00 00 00 00 00 | QUERY TX INTERVALS, SLEEP TIMER, TX PWR |
| RuuviTag | 0xF2 81 03 07 | 01 F2 05 00 00 00 04 | REPLY TX INTERVALS, SLEEP TIMER, TX PWR |
| | | | Unregister from TX notifications |
| | | | Disconnect GATT |