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 . 65334. 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 implememented 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:
iBeacon UUID: 0x00 01 02 03 04 05 06 07 08 09 0A 0B 0C 0D 0E 0F
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.

Configurator Tag

```
                        <-> Establish GATT connection <->
                              <-> Read Services <->
                    <-> Read Characteristics of each service <->
              <-> Register to TX characteristic notifications of NUS <->
0x80 F3 02 16 00 01 02 03 04 05 06 07 08 09 0A 0B 0C 0D 0E 0F -> UNLOCK ->
   <- UNLOCK OK <- 0xF3 80 03 16 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
0x80 F0 02 16 0F 0E 0D 0C 0B 0A 09 08 07 06 05 04 03 02 01 00 -> UUID ->
     <- UUID OK <- 0xF0 80 03 16 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
0x81 F0 04 16 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 -> QUERY UUID ->
  <- REPLY UUID <- 0xF0 81 03 16 0F 0E 0D 0C 0B 0A 09 08 07 06 05 04 03 02 01 00
0x80 F1 02 05 12 34 00 01 A8 -> MAJOR ID, MINOR ID, RX PWR ->
                          <- MAJOR, MINOR, PWR OK <- 0xF1 80 03 05 00 00 00 00 00
0x81 F2 04 05 00 00 00 00 00 -> READ MAJOR, MINOR, PWR ->
                       <- REPLY MAJOR, MINOR, PWR <- 0xF1 81 03 05 12 34 00 01 A8
0x80 F2 02 07 01 F2 05 00 00 00 04 -> SET TX INTERVALS, SLEEP TIMER, TX PWR ->
 <- TX INTERVALS, SLEEP TIMER, TX PWR OK <- 0xF2 0x80 03 07 00 00 00 00 00 00 00
0x81 F2 04 07 00 00 00 00 00 00 00 -> QUERY TX INTERVALS, SLEEP TIMER, TX PWR ->
<- REPLY TX INTERVALS, SLEEP TIMER, TX PWR <- 0XF2 81 03 07 01 F2 05 00 00 00 04
                     <-> Unregister from TX notifications <->
                              <-> Disconnect GATT <->
```