NeuroSky BLE Spec Sheet

October 30, 2017

NeuroSky
Brain-Computer Interface Technologies

The NeuroSky® product families consist of hardware and software components for simple integration of this biosensor technology into consumer and industrial end-applications. All products are designed and manufactured to meet consumer thresholds for quality, pricing, and feature sets. NeuroSky sets itself apart by providing building block component solutions that offer friendly synergies with related and complementary technological solutions.

Contents

Introduction

This document summarizes the BLE specifications in order to develop a communication SDK around the NeuroSky Bluetooth Smart Ready products.

BLE Interface

BLE Advertisement Contents

- kCBAdvDataChannel = 37 or 38 or 39; — Radio related configuration specific to a connection attempt
- kCBAdvDataIsConnectable = 1; — device is available for connection
- kCBAdvDataLocalName — For example: "Life Beat";

Generic BLE Services

Device ID and Battery are provided by Generic Services

Device Information Service (0x180A)

- Manufacturer Name UUID: 0x2A29 (Read)
- Model Number Characteristic UUID: 0x2A24 (Read)
- Serial Number Characteristic UUID: 0x2A25 (Read)
- Hardware Revision Characteristic UUID: 0x2A27 (Read)
- Firmware Revision Characteristic UUID (BLE Firmware Version): 0x2A26 (Read)
- Software Revision Characteristic UUID (MCU Firmware Version): 0x2A28 (Read)

NeuroSky Customized Service and Characteristics

All NeuroSky Customized characteristics are listed under this service UUID:

```
039AFFF0-2C94-11E3-9E06-0002A5D5C51B
```

eSense and EEG Band

- Short UUID: FFF8
- Long UUID: 039AFFF8-2C94-11E3-9E06-0002A5D5C51B
- Read/Notify Characteristic

EEG eSense Data

Byte	Description	Notes
0 to 1	reserved	
2	0xEA - Format code	Always 0xEA
3 to 4	reserved	
5	0x02	Poor Signal Code
6	Poor Signal Quality	
7	0x04	Attention Code
8	Attention eSense	
9	0x05	Meditation Code
10	Meditation eSense	
11 to 19	reserved	

First EEG Band Power Data

Byte	Description	Notes
0 to 1	reserved	
2	0xEB - Format code	Always 0xEB
3	reserved	
4	0x06	Delta Code
5 to 7	Delta bytes	3 bytes
8	0x07	Theta Code
9 to 11	Theta bytes	3 bytes
12	0x08	Low-Alpha Code
13 to 15	Low-Alpha bytes	3 bytes
16	0x09	High-Alpha Code
17 to 19	High-Alpha bytes	3 bytes

Second EEG Band Power Data

Byte	Description	Notes
0 to 1	reserved	
2	0xEC - Format code	Always 0xEC
3	reserved	
4	0x0A	Low-Beta Code
5 to 7	Low-Beta bytes	3 bytes
8	0x0B	High-Beta Code
9 to 11	High-Beta bytes	3 bytes
12	0x0C	Low-Gamma Code
13 to 15	Low-Gamma bytes	3 bytes
16	0x0D	Mid-Gamma Code
17 to 19	Mid-Gamma bytes	3 bytes

Handshake/Command

- Short UUID: FFA0
- Long UUID: 039AFFA0-2C94-11E3-9E06-0002A5D5C51B
- Write Characteristic (Write 20 bytes only)

List of Commands

Update and Send Battery Level	0x77 0x01 0x06 0x00 0x00 0x00 0x00 0x00 0x00 0x00 0x00 0x00 0x00 0x00 0x00 0x00 0x00 0x00 0xF8
Start Real Time EEG Raw Data	0x77 0x01 0x15 0x00 0x00 0x00 0x00 0x00 0x00 0x00 0x00 0x00 0x00 0x00 0x00 0x00 0x00 0x00 0xE9
Stop Real Time EEG Raw Data	0x77 0x01 0x16 0x00 0x00 0x00 0x00 0x00 0x00 0x00 0x00 0x00 0x00 0x00 0x00 0x00 0x00 0x00 0xE8
Start EEG eSense and Power Band	0x77 0x01 0x17 0x00 0x00 0x00 0x00 0x00 0x00 0x00 0x00 0x00 0x00 0x00 0x00 0x00 0x00 0x00 0xE7
Stop EEG eSense and Power Band	0x77 0x01 0x18 0x00 0x00 0x00 0x00 0x00 0x00 0x00 0x00 0x00 0x00 0x00 0x00 0x00 0x00 0x00 0xE6

Real-time EEG

- Short UUID: FFF4
- Long UUID: 039AFFF4-2C94-11E3-9E06-0002A5D5C51B
- Notify Characteristic
- Sample Rate: 512

The Real-time EEG characteristic will be used to transmit the real time EEG data. RAW SAMPLE data: 20 bytes containing ten 12 bit samples.

Note: Real-time EEG (Notify Characteristic) will be triggered by sending "Start Real Time EEG Raw Data" command.