Physical Layer Operation:

The standard operation mode of the LogR shoepod (model# SSV2, FW V1.3.10), behaves as per the Bluetooth Core V4.0 Volume 6 specification. The radio utilizes 40 channels (#0-39) to advertise it presence and exchange data to the master once paired. The Bluetooth Low Energy (BLE) operates in the 2.4GHz ISM band at 2400-2483.5MHz, more specifically the center frequencies as described in table 1.

Regulatory Range	Channels
2400-2483.5 MHz	2402+k*2 MHz, k=0,…,39

Table 1: Operating Frequency Bands

As per the BLE specifications, RF channels 0, 12 and 39 are used to advertise the slave's presence to a master. Once the master has paired to one (or two) LogR shoepods data will be transmitted to the master on the data channels (RF channel #1-11 and 13-38).

Further details on the physical layer specification can be found in the Bluetooth Core V4.0, Volume 6, Part A, and TI BLE Developer Guide, Sections 1, 2 and 3.

LogR Message Service and Characteristics:

Details regarding the data packets for the UUID's regarding the advertising and data exchange is described in more detail below. The LogR shoepod utilizes the following UUIDs to describe the service and the characteristics within this service.
UUID: SURROSENSE_SERVICE_UUID = c19f0001-0341-474a-aa2a-7fb9ebaddf6b
UUID: SENSOR_READING_CHARACTERISTIC_UUID = c19f0004-0341-474a-aa2a-7fb9ebaddf6b

Advertising Message Details:

Advertising Packet details:

- 3 bytes – supported advertising features
- 18 bytes – UUID descriptions
- 8 bytes – Manufacturer data

If LogR shoepod is not paired to a master device (iOS app), advertising packets will be transmitted for 10sec after reset or start-up of the shoepod. During which an advertising message is consecutively on each advertising channel every 100ms. If after this initial 10 seconds a shoepod remains unpaired to a master the shoepod will advertise its presence on all 3 channels every 5 seconds. Additional details can be found in Bluetooth Core V4.0, Volume 6, Part D, Section 3.

Data Exchange Message Details:

Data Packet details:

- 16 bytes -- sensor readings (8 sensors * 2 bytes)
- 1 byte -- battery percentage
- 1 byte -- sequence number
- 2 bytes -- CRC

Once a LogR shoepod is paired with a master, a data packet is transmitted every 10ms. Once paired the LogR shoepod will behave as a slave to the master, meaning that channel configuration is determined by the master. Additional details on the message sequencing can be found in Bluetooth Core V4.0, Volume 6, Part D, Section 6.

The implementation details and comments can be found in the LogR SSV2 BLE Profile .c and .h files.