GATT Specification Supplement

***Bluetooth*® Specification**

- **Revision:** v1.1
- **Revision Date:** 2019-12-17
- **Group Prepared By:** Bluetooth Architectural Review Board (BARB)
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Abstract:

This specification contains the normative definitions for all GATT characteristics and characteristic descriptors, with the exception of those defined in the Bluetooth Core Specification or in Bluetooth Service specifications.

Revision History

Revision Number	Date	Comments
v1.0	2017-Jul-12	Adopted by the Bluetooth SIG Board of Directors.
v1.1	2019-12-17	Adopted by the Bluetooth SIG Board of Directors.

Version History

Versions	Changes
v1.0 to v1.1	Incorporated GATT Specification Supplement CR 1.1.

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Contents

1 Introduction

This specification contains the normative definitions for all adopted GATT characteristics and characteristic descriptors, with the exception of those defined in the Bluetooth Core Specification or in Bluetooth Service specifications.

1.1 Language

1.1.1 Language conventions

The Bluetooth SIG has established the following conventions for use of the words ***shall***, ***must***, ***will***, ***should***, ***may***, ***can***, ***is***, and ***note*** in the development of specifications:

shall	is required to – used to define requirements.
must	is used to express: a natural consequence of a previously stated mandatory requirement. OR an indisputable statement of fact (one that is always true regardless of the circumstances).
will	it is true that – only used in statements of fact.
should	is recommended that – used to indicate that among several possibilities one is recommended as particularly suitable, but not required.
may	is permitted to – used to allow options.
can	is able to – used to relate statements in a causal manner.
is	is defined as – used to further explain elements that are previously required or allowed.
note	Used to indicate text that is included for informational purposes only and is not required in order to implement the specification. Each note is clearly designated as a “Note” and set off in a separate paragraph.

For clarity of the definition of those terms, see Core Specification Volume 1, Part E, Section 1.

1.1.2 Reserved for Future Use

Where a field in a packet, Protocol Data Unit (PDU), or other data structure is described as "Reserved for Future Use" (irrespective of whether in uppercase or lowercase), the device creating the structure shall set its value to zero unless otherwise specified. Any device receiving or interpreting the structure shall ignore that field; in particular, it shall not reject the structure because of the value of the field.

Where a field, parameter, or other variable object can take a range of values, and some values are described as "Reserved for Future Use," a device sending the object shall not set the object to those values. A device receiving an object with such a value should reject it, and any data structure containing it, as being erroneous; however, this does not apply in a context where the object is described as being ignored or it is specified to ignore unrecognized values.

When a field value is a bit field, unassigned bits can be marked as Reserved for Future Use and shall be set to 0. Implementations that receive a message that contains a Reserved for Future Use bit that is set to 1 shall process the message as if that bit was set to 0, except where specified otherwise.

The acronym RFU is equivalent to Reserved for Future Use.

1.1.3 Prohibited

When a field value is an enumeration, unassigned values can be marked as “Prohibited.” These values shall never be used by an implementation, and any message received that includes a Prohibited value shall be ignored and shall not be processed and shall not be responded to.

Where a field, parameter, or other variable object can take a range of values, and some values are described as “Prohibited,” devices shall not set the object to any of those Prohibited values. A device receiving an object with such a value should reject it, and any data structure containing it, as being erroneous.

“Prohibited” is never abbreviated.

2 Values and represented values

The characteristic value associated with a characteristic is a raw value that is not self-describing. Each characteristic value contains one or more fields. The interpretation of the meaning of the raw value stored in the characteristic shall be defined in the characteristic definition. Common default rules for interpretation of characteristics representing scalar values and for byte ordering are given in the following subsections. These rules apply unless otherwise overridden by a specific characteristic definition.

2.1 Scalar values

When a characteristic field represents a scalar value and unless otherwise specified by the characteristic definition, the represented value is related to the raw value by the following equations, where the M coefficient, d, and b exponents are defined per field of characteristic:

$$R = C * M * 10^{d} * 2^{b}$$

Where:

R = represented value

C = raw value

M = multiplier, positive or negative integer (between -10 and +10)

d = decimal exponent, positive or negative integer

b = binary exponent, positive or negative integer

The default values are: M = 1, d = 0 and b = 0.

2.1.1 Example decimal exponent

To represent a length in decimeters with a resolution of one decimeter within a characteristic value, the following values are used:

M = 1, d = -1, b = 0

2.1.2 Example binary exponent

To represent a duration in 256ths of a second with a precision of 1/256s within a characteristic value, the following values are used:

M = 1, d = 0, b = -8

2.1.3 Example multiplier

To represent the horizontal dilution of precision with an accuracy of 1/5 with a precision of 1/5 within a characteristic value, the following values are used:

M = 2, d = -1, b = 0

2.2 Octet ordering

Where characteristics and descriptors are made up of multiple octets, and unless otherwise specified by the characteristic definition, the Least Significant Octet (LSO) is defined as the eight low-numbered bits

(i.e. bits 0 to 7) of the top most field in the table. The Most Significant Octet (MSO) is defined as the high-numbered bits of the bottom most field in the table, see example in Table 2.1.

Field	Data Type	Size (in octets)	Field content description
Field 1	xxx	1	Placed on LSO (bits 0 to 7)
…	…	…	…
Field n	xxx	1	Placed on MSO

Table 2.1: Byte ordering example table

2.3 CRC calculation

If not defined in the service, the CRC is defined using a CRC-CCITT generator polynomial $g(D)=D^{16}+D^{12}+D^{5}+1$ (i.e. 210041 in octal representation) with a seed of 0xFFFF.

The CRC shift register is filled with 1s before calculating the CRC. Octets are fed through the CRC generator least significant bit first.

The most significant parity octet is transmitted first (where the CRC shift register is viewed as shifting from the least significant bit towards the most significant bit). Therefore, the transmission order of the parity octets within the CRC shift register is as follows:

x[8], x[9], …, x[15], x[0], x[1]…; x[7] (last)

where x[15] correspondents to the highest power CRC coefficient and x[0] corresponds to the lowest power coefficient.

The switch shall be set in position 1 while the data is shifted in. After the last bit has entered the Linear Feedback Shift Register (LFSR), the switch (S) shall be set in position 2, and the register contents shall be read out.

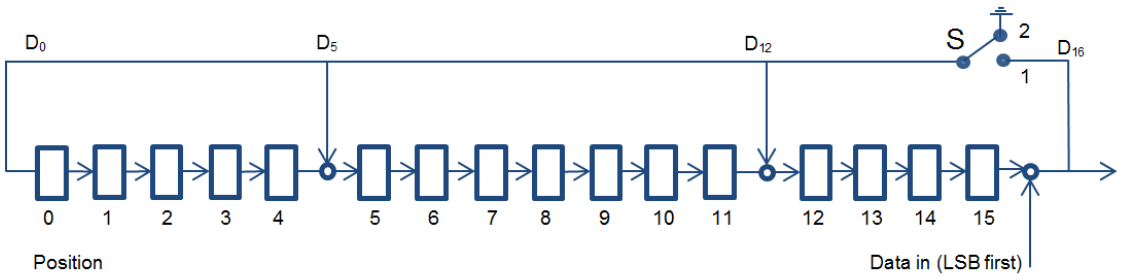

Figure 2.1: LSFR circuit generating the CRC

The computation for a sample with 10 bytes of data is the following:

data[0] = 0x3E
data[1] = 0x01
data[2] = 0x02
data[3] = 0x03
data[4] = 0x04
data[5] = 0x05

data[6] = 0x06
data[7] = 0x07
data[8] = 0x08
data[9] = 0x09

➔ CRC = 01 2F (LSB … MSB)

Based on little endianness the output of the shift register is 0x2F01 (MSB…LSB)

Note: See also Volume 2, Part B, Section 7.1.2 in [1] for more details. For E2E-CRC the Linear Feedback Shift Register is initially loaded with a seed of 0xFFFF instead of the UAP and the calculation is done in the same way.

3 Characteristics

Characteristics are listed in alphabetical order.

All fields in a characteristic are little endian unless otherwise stated.

When referring to a characteristic Universally Unique Identifier (UUID), the name of the characteristic is placed inside of « and » [characters]. For example, «Alert Category ID» references the UUID of the Alert Category ID.

In case a characteristic is composed of several fields, all fields are by default mandatory unless otherwise specified as optional or conditional.

The Data Types not explicitly defined here are defined on the assigned numbers page [4].

3.1 Aerobic Heart Rate Lower Limit

3.1.1 Description

The Aerobic Heart Rate Lower Limit characteristic exposes the lower limit of the heart rate, where the user enhances his or her endurance while exercising, for the current user (i.e. the user that has given consent to access the UDS Characteristics).

The Aerobic Heart Rate Lower Limit characteristic is a member of the set of “UDS Characteristics” listed in the User Data Service Characteristics Table in the Bluetooth SIG Assigned Numbers (see the User Data Service [5]).

The Aerobic Heart Rate Lower Limit characteristic is a fixed-length structure containing a single field.

3.1.2 Definition

The structure of this characteristic is defined below:

Field	Data Type	Size (in octets)	Description
Aerobic Heart Rate Lower Limit	uint8	1	Unit: org.bluetooth.unit.period.beats_per_minute

Table 3.1: Structure of the Aerobic Heart Rate Lower Limit characteristic

3.2 Aerobic Heart Rate Upper Limit

3.2.1 Description

The Aerobic Heart Rate Upper Limit characteristic exposes the upper limit of the heart rate, where the user enhances his or her endurance while exercising, for the current user (i.e. the user that has given consent to access the UDS Characteristics).

The Aerobic Heart Rate Upper Limit characteristic is a member of the set of “UDS Characteristics” listed in the User Data Service Characteristics Table in the Bluetooth SIG Assigned Numbers (see the User Data Service [5]).

The Aerobic Heart Rate Upper Limit characteristic is a fixed-length structure containing a single field.

3.2.2 Definition

The structure of this characteristic is defined below:

Field	Data Type	Size (in octets)	Description
Aerobic Heart Rate Upper Limit	uint8	1	Unit: org.bluetooth.unit.period.beats_per_minute

Table 3.2: Structure of the Aerobic Heart Rate Upper Limit characteristic

3.3 Aerobic Threshold

3.3.1 Description

The Aerobic Threshold characteristic exposes the aerobic threshold of the current user (i.e. the user that has given consent to access the UDS Characteristics).

The Aerobic Threshold characteristic is a member of the set of “UDS Characteristics” listed in the User Data Service Characteristics Table in the Bluetooth SIG Assigned Numbers (see the User Data Service [5]). Aerobic Threshold and Anaerobic Threshold characteristics together with the Sport Type For Aerobic And Anaerobic Thresholds characteristic describe the metabolic thresholds of the user. The Sport Type For Aerobic And Anaerobic Thresholds characteristic value identifies how the measurement was performed.

The Aerobic Threshold characteristic is a fixed-length structure containing a single field.

3.3.2 Definition

The structure of this characteristic is defined below:

Field	Data Type	Size (in octets)	Description
Aerobic Threshold	uint8	1	Unit: org.bluetooth.unit.period.beats_per_minute

Table 3.3: Structure of the Aerobic Threshold characteristic

3.4 Age

3.4.1 Description

The Age characteristic exposes the age of the current user (i.e. the user that has given consent to access the UDS Characteristics).

The Age characteristic is a member of the set of “UDS Characteristics” listed in the User Data Service Characteristics Table in the Bluetooth SIG Assigned Numbers (see the User Data Service [5]).

The Age characteristic is a fixed-length structure containing a single field.

3.4.2 Definition

The structure of this characteristic is defined below:

Field	Data Type	Size (in octets)	Description
Age	uint8	1	Unit: org.bluetooth.unit.time.year

Table 3.4: Structure of the Age characteristic

3.5 Alert Category ID

3.5.1 Description

Categories of alerts/messages are defined below. The Alert Category ID characteristic defines the predefined categories of messages as an enumeration.

3.5.2 Definition

The structure of this characteristic is defined below:

Field	Data Type	Size (in octets)	Description
Category ID	uint8	1	See Section 3.5.2.1

Table 3.5: Structure of the Alert Category ID characteristic

3.5.2.1 Category ID field

The following values are defined for the Category ID field:

Description	Value
Simple Alert	0
Email	1
News	2

Description	Value
Call	3
Missed Call	4
SMS/MMS	5
Voice Mail	6
Schedule	7
High Prioritized Alert	8
Instant Message	9
Reserved for Future Use	10–250
Defined by Service Specification	251–255

Table 3.6: Category ID field

3.6 Alert Category ID Bit Mask

3.6.1 Description

Categories of alerts/messages are defined below. The value of the characteristic is a bit mask implemented as an array of unsigned 8-bit integers. The Alert Category ID Bit Mask characteristic defines one bit for each predefined category ID.

3.6.2 Definition

The structure of this characteristic is defined below:

Field	Data Type	Size (in octets)	Description
Category ID Bit Mask	uint8	1–2	See Section 3.6.2.1

Table 3.7: Structure of the Alert Category ID Bit Mask characteristic

3.6.2.1 Category ID Bit Mask

This field is a bit mask spanning one or more octets. If a bit is set to 0, the associated feature is not supported. If the bit is set to 1, the associated feature is supported.

The following bits are defined for the first octet of the Category ID Bit Mask field:

Bit	Bit Name
0	Simple Alert
1	Email
2	News

Bit	Bit Name
3	Call
4	Missed Call
5	SMS/MMS
6	Voice Mail
7	Schedule

Table 3.8: Category ID Bit Mask field, Octet 0

The following bits are defined for the second octet of the Category ID Bit Mask field:

Bit	Bit Name
0	High Prioritized Alert
1	Instant Message
2–7	Reserved for Future Use

Table 3.9: Category ID Bit Mask field, Octet 1

3.7 Alert Level

3.7.1 Description

The Alert Level characteristic is used to specify the degree of alerting for a device.

3.7.2 Definition

The structure of this characteristic is defined below:

Field	Data Type	Size (in octets)	Description
Alert Level	uint8	1	See Section 3.7.2.1

Table 3.10: Structure of the Alert Level characteristic

3.7.2.1 Alert Level field

The following values are defined for the Alert Level field:

Description	Value
No Alert	0x00
Mild Alert	0x01

Description	Value
High Alert	0x02
Reserved for Future Use	0x03–0xFF

Table 3.11: Alert Level field

3.8 Alert Notification Control Point

3.8.1 Description

The Control point of the Alert Notification server is described below. Client can write the command here to request the several functions toward the server.

3.8.2 Definition

The structure of this characteristic is defined below:

Field	Data Type	Size (in octets)	Description
Command ID	uint8	1	See Section 3.8.2.1
Category ID	struct	1	Refer to Alert Category ID characteristic Section 3.1

Table 3.12: Structure of the Ringer Control Point characteristic

3.8.2.1 Command ID field

The Command ID field is an enumeration of requested actions on the server.

The following values are defined for the Command ID field:

Description	Value
Enable New Incoming Alert Notification	0
Enable Unread Category Status Notification	1
Disable New Incoming Alert Notification	2
Disable Unread Category Status Notification	3
Notify New Incoming Alert immediately	4
Notify Unread Category Status immediately	5
Reserved for Future Use	6–255

Table 3.13: Command ID field

3.8.2.2 Category ID field

This field is an instance of the Alert Category ID characteristic; see Section 3.1.

This field shows the target category to which the command ID applies.

3.9 Alert Status

3.9.1 Description

The Alert Status characteristic defines the status of a phone alert.

3.9.2 Definition

The structure of this characteristic is defined below:

Field	Data Type	Size (in octets)	Description
Alert Status	struct	1	See Section 3.9.2.1

Table 3.14: Structure of the Alert Status characteristic

3.9.2.1 Alert Status field

This field is a bit map of bits that expose alert states of the server device.

The bits of this field are defined as:

Bit	Bit Name
0	Ringer State 0 = Ringer State not active 1 = Ringer State active
1	Vibrate State 0 = Vibrate State not active 1 = Vibrate State active
2	Display Alert Status 0 = Display Alert Status not active 1 = Display Alert Status active
4–7	Reserved for Future Use

Table 3.15: Adjust Status field

3.10 Anaerobic Heart Rate Lower Limit

3.10.1 Description

The Anaerobic Heart Rate Lower Limit characteristic exposes the lower limit of the heart rate, where the user enhances his or her anaerobic tolerance while exercising, for the current user (i.e. the user that has given consent to access the UDS Characteristics).

The Anaerobic Heart Rate Lower Limit characteristic is a member of the set of “UDS Characteristics” listed in the User Data Service Characteristics Table in the Bluetooth SIG Assigned Numbers (see the User Data Service [5]).

The Anaerobic Heart Rate Lower Limit characteristic is a fixed-length structure containing a single field.

3.10.2 Definition

The structure of this characteristic is defined below:

Field	Data Type	Size (in octets)	Description
Anaerobic Heart Rate Lower Limit	uint8	1	Unit: org.bluetooth.unit.period.beats_per_minute

Table 3.16: Structure of the Anaerobic Heart Rate Lower Limit characteristic

3.11 Anaerobic Heart Rate Upper Limit

3.11.1 Description

The Anaerobic Heart Rate Upper Limit characteristic exposes the upper limit of the heart rate, where the user enhances his or her anaerobic tolerance while exercising, for the current user (i.e. the user that has given consent to access the UDS Characteristics).

The Anaerobic Heart Rate Upper Limit characteristic is a member of the set of “UDS Characteristics” listed in the User Data Service Characteristics Table in the Bluetooth SIG Assigned Numbers (see the User Data Service [5]).

The Anaerobic Heart Rate Upper Limit characteristic is a fixed-length structure containing a single field.

3.11.2 Definition

The structure of this characteristic is defined below:

Field	Data Type	Size (in octets)	Description
Anaerobic Heart Rate Upper Limit	uint8	1	Unit: org.bluetooth.unit.period.beats_per_minute

Table 3.17: Structure of the Anaerobic Heart Rate Upper Limit characteristic

3.12 Anaerobic Threshold

3.12.1 Description

The Anaerobic Threshold characteristic exposes the anaerobic threshold of the current user (i.e. the user that has given consent to access the UDS Characteristics).

The Anaerobic Threshold characteristic is a member of the set of “UDS Characteristics” listed in the User Data Service Characteristics Table in the Bluetooth SIG Assigned Numbers (see the User Data Service [5]). The Aerobic Threshold and Anaerobic Threshold characteristics together with the Sport Type For Aerobic And Anaerobic Thresholds characteristic describe the metabolic thresholds of the user. The Sport Type For Aerobic And Anaerobic Thresholds characteristic value identifies how the measurement was performed.

The Anaerobic Threshold characteristic is a fixed-length structure containing a single field.

3.12.2 Definition

The structure of this characteristic is defined below:

Field	Data Type	Size (in octets)	Description
Anaerobic Threshold	uint8	1	Unit: org.bluetooth.unit.period.beats_per_minute

Table 3.18: Structure of the Anaerobic Threshold characteristic

3.13 Apparent Wind Direction

3.13.1 Description

The Apparent Wind Direction characteristic is used to represent the apparent wind direction.

The apparent wind direction is the wind experienced by an observer in motion and is the relative direction of the wind in relation to the observer. For example, the apparent wind direction aboard a boat is given in degrees relative to the heading of the boat.

The apparent wind direction is reported by the direction from which it appears to originate. For example, an apparent wind coming from a direction that is 45 degrees clockwise relative to the heading of the observer is given as 45 degrees; one that is from a direction 45 degrees anti-clockwise relative to the heading of the observer is given as 315 degrees.

The Apparent Wind Direction characteristic is a fixed-length structure containing a single Apparent Wind Direction field.

3.13.2 Definition

The structure of this characteristic is defined below:

Field	Data Type	Size (in octets)	Description
Apparent Wind Direction	uint16	2	Base Unit: org.bluetooth.unit.plane_angle.degree Minimum value: 0 Maximum value: 359.99 Represented values: M = 1, d = -2, b = 0 Unit is degrees with a resolution of 0.01 degrees.

Table 3.19: Structure of the Apparent Wind Direction characteristic

3.14 Apparent Wind Speed

3.14.1 Description

The Apparent Wind Speed characteristic is used to represent the apparent wind speed.

The apparent wind speed is the wind experienced by an observer in motion and is the relative speed of the wind in relation to the observer.

The Apparent Wind Speed characteristic is a fixed-length structure containing a single Apparent Wind Speed field.

3.14.2 Definition

The structure of this characteristic is defined below:

Field	Data Type	Size (in octets)	Description
Apparent Wind Speed	uint16	2	Base Unit: org.bluetooth.unit.velocity.metres_per_second Represented values: M = 1, d = -2, b = 0 Unit is in meters per second with a resolution of 0.01 m/s.

Table 3.20: Structure of the Apparent Wind Speed characteristic

3.15 Appearance

3.15.1 Description

The Appearance characteristic represents the external appearance of a device as defined in Table 3.21. The characteristic format is composed of an Appearance Value (16 bits) that is split into a Sub-category field (6 bits) and a Category field (10 bits).

3.15.2 Definition

The structure of the characteristic is defined in Table 3.21.

Field		Data Type	Size (in octets)	Field content description
Appearance Value	Sub-category	6 bit (bits 0–5)	2	See Section 3.15.2.1
	Category	10 bits (bits 6–15)		

Table 3.21: Appearance characteristic

3.15.2.1 Category and Sub-category fields

The values of this field are defined in Table 3.22.

Category (10 bits)	Sub-category (6 bits)	Value Definition	Description
0	0	Unknown	None
	1–63	Reserved For Future Use	
64	0	Generic Phone	Generic category
	1–63	Reserved For Future Use	
128	0	Generic Computer	Generic category
	1–63	Reserved For Future Use	
192	0	Generic Watch	Generic category
	1	Watch: Sports Watch concatenated value: 193	Watch subtype
	2–63	Reserved For Future Use	
256	0	Generic Clock	Generic category
	1–63	Reserved For Future Use	
320	0	Generic Display	Generic category

Category (10 bits)	Sub-category (6 bits)	Value Definition	Description
	1–63	Reserved For Future Use	
384	0	Generic Remote Control	Generic category
	1–63	Reserved For Future Use	
448	0	Generic Eye-glasses	Generic category
	1–63	Reserved For Future Use	
512	0	Generic Tag	Generic category
	1–63	Reserved For Future Use	
576	0	Generic Keyring	Generic category
	1–63	Reserved For Future Use	
640	0	Generic Media Player	Generic category
	1–63	Reserved For Future Use	
704	0	Generic Barcode Scanner	Generic category
	1–63	Reserved For Future Use	
768	0	Generic Thermometer	Generic category
	1	Thermometer: Ear (concatenated value: 769)	Thermometer subtype
	2–63	Reserved For Future Use	
832	0	Generic Heart Rate Sensor	Generic category
	1	Heart Rate Sensor: Heart Rate Belt (concatenated value: 833)	Heart Rate Sensor subtype
	2–63	Reserved For Future Use	
896	0	Generic Blood Pressure	Generic category
	1	Blood Pressure: Arm (concatenated value: 897)	Blood Pressure subtype
	2	Blood Pressure: Wrist (concatenated value: 898)	Blood Pressure subtype
	3–63	Reserved For Future Use	
960	0	Generic Human Interface Device (HID)	HID Generic

Category (10 bits)	Sub-category (6 bits)	Value Definition	Description
	1	Keyboard (concatenated value: 961)	HID subtype
	2	Mouse (concatenated value: 962)	HID subtype
	3	Joystick (concatenated value: 963)	HID subtype
	4	Gamepad (concatenated value: 964)	HID subtype
	5	Digitizer Tablet (concatenated value: 965)	HID subtype
	6	Card Reader (concatenated value: 966)	HID subtype
	7	Digital Pen (concatenated value: 967)	HID subtype
	8	Barcode Scanner (concatenated value: 968)	HID subtype
	9–63	Reserved For Future Use	
1024	0	Generic Glucose Meter	Generic category
	1–63	Reserved For Future Use	
1088	0	Generic: Running Walking Sensor	Generic category
	1	Running Walking Sensor: In-Shoe (concatenated value: 1089)	Running Walking Sensor subtype
	2	Running Walking Sensor: On-Shoe (concatenated value: 1090)	Running Walking Sensor subtype
	3	Running Walking Sensor: On-Hip (concatenated value: 1091)	Running Walking Sensor subtype
	4–63	Reserved For Future Use	
1152	0	Generic: Cycling	Generic category
	1	Cycling: Cycling Computer (concatenated value: 1153)	Cycling subtype
	2	Cycling: Speed Sensor (concatenated value: 1154)	Cycling subtype
	3	Cycling: Cadence Sensor (concatenated value: 1155)	Cycling subtype
	4	Cycling: Power Sensor (concatenated value: 1156)	Cycling subtype

Category (10 bits)	Sub-category (6 bits)	Value Definition	Description
	5	Cycling: Speed and Cadence Sensor (concatenated value: 1157)	Cycling subtype
	6–63	Reserved For Future Use	
1216	0	Generic Control Device	Generic category
	1	Switch	Control Device subtype
	2	Multi-switch	Control Device subtype
	3	Button	Control Device subtype
	4	Slider	Control Device subtype
	5	Rotary	Control Device subtype
	6	Touch-panel	Control Device subtype
	7–63	Reserved for Future Use	
1280	0	Generic Network Device	Generic category
	1	Access Point	Generic Network subtype
	2–63	Reserved for Future Use	
1344	0	Generic Sensor	Generic category
	1	Motion Sensor	Sensor subtype
	2	Air Quality Sensor	Sensor subtype
	3	Temperature Sensor	Sensor subtype
	4	Humidity Sensor	Sensor subtype
	5	Leak Sensor	Sensor subtype
	6	Smoke Sensor	Sensor subtype
	7	Occupancy Sensor	Sensor subtype
	8	Contact Sensor	Sensor subtype
	9	Carbon Monoxide Sensor	Sensor subtype
	10	Carbon Dioxide Sensor	Sensor subtype
	11	Ambient Light Sensor	Sensor subtype
	12	Energy Sensor	Sensor subtype

Category (10 bits)	Sub-category (6 bits)	Value Definition	Description
	13	Color Light Sensor	Sensor subtype
	14	Rain Sensor	Sensor subtype
	15	Fire Sensor	Sensor subtype
	16	Wind Sensor	Sensor subtype
	17	Proximity Sensor	Sensor subtype
	18	Multi-Sensor	Sensor subtype
	19–63	Reserved for Future Use	
1408	0	Generic Light Fixtures	Generic category
	1	Wall Light	Light Fixture subtype
	2	Ceiling Light	Light Fixture subtype
	3	Floor Light	Light Fixture subtype
	4	Cabinet Light	Light Fixture subtype
	5	Desk Light	Light Fixture subtype
	6	Troffer Light	Light Fixture subtype
	7	Pendant Light	Light Fixture subtype
	8	In-ground Light	Light Fixture subtype
	9	Flood Light	Light Fixture subtype
	10	Underwater Light	Light Fixture subtype
	11	Bollard with Light	Light Fixture subtype
	12	Pathway Light	Light Fixture subtype
	13	Garden Light	Light Fixture subtype
	14	Pole-top Light	Light Fixture subtype
	15	Spotlight	Light Fixture subtype
	16	Linear Light	Light Fixture subtype
	17	Street Light	Light Fixture subtype
	18	Shelves Light	Light Fixture subtype

Category (10 bits)	Sub-category (6 bits)	Value Definition	Description
	19	High-bay / Low-bay Light	Light Fixture subtype
	20	Emergency Exit Light	Light Fixture subtype
	21–63	Reserved for Future Use	
1472	0	Generic Fan	Generic category
	1	Ceiling Fan	Fan subtype
	2	Axial Fan	Fan subtype
	3	Exhaust Fan	Fan subtype
	4	Pedestal Fan	Fan subtype
	5	Desk Fan	Fan subtype
	6	Wall Fan	Fan subtype
	7–63	Reserved for Future Use	
1536	0	Generic HVAC	Generic category
	1	Thermostat	HVAC subtype
	2–63	Reserved for Future Use	
1600	0	Generic Air Conditioning	Generic category
	1–63	Reserved for Future Use	
1664	0	Generic Humidifier	Generic category
	1–63	Reserved for Future Use	
1728	0	Generic Heating	Generic category
	1	Radiator	Heating subtype
	2	Boiler	Heater subtype
	3	Heat Pump	Heater subtype
	4	Infrared Heater	Heater subtype
	5	Radiant Panel Heater	Heater subtype
	6	Fan Heater	Heater subtype
	7	Air Curtain	Heater subtype

Category (10 bits)	Sub-category (6 bits)	Value Definition	Description
	8–63	Reserved for Future Use	
1792	0	Generic Access Control	Generic category
	1	Access Door	Access subtype
	2	Garage Door	Access subtype
	3	Emergency Exit Door	Access subtype
	4	Access Lock	Access subtype
	5	Elevator	Access subtype
	6	Window	Access subtype
	7	Entrance Gate	Access subtype
	8–63	Reserved for Future Use	
1856	0	Generic Motorized Device	Generic category
	1	Motorized Gate	Motorized subtype
	2	Awning	Motorized subtype
	3	Blinds or Shades	Motorized subtype
	4	Curtains	Motorized subtype
	5	Screen	Motorized subtype
	6–63	Reserved for Future Use	Motorized subtype
1920	0	Generic Power Device	Generic category
	1	Power Outlet	Power subtype
	2	Power Strip	Power subtype
	3	Plug	Power subtype
	4	Power Supply	Power subtype
	5	LED Driver	Power subtype
	6	Fluorescent Lamp Gear	Power subtype
	7	HID Lamp Gear	Power subtype
	8–63	Reserved for Future Use	

Category (10 bits)	Sub-category (6 bits)	Value Definition	Description
1984	0	Generic Light Source	Generic category
	1	Incandescent Light Bulb	Light subtype
	2	LED Bulb	Light subtype
	3	HID Lamp	Light subtype
	4	Fluorescent Lamp	Light subtype
	5	LED Array	Light subtype
	6	Multi-Color LED Array	Light subtype
	7–63	Reserved for Future Use	
3136	0	Generic Pulse Oximeter	Generic category
	1	Fingertip (concatenated value: 3137)	Pulse Oximeter subtype
	2	Wrist Worn (concatenated value: 3138)	Pulse Oximeter subtype
	3–63	Reserved For Future Use	
3200	0	Generic: Weight Scale	Generic category
	1–63	Reserved For Future Use	
5184	0	Generic Outdoor Sports Activity	Generic category
	1	Location Display Device (concatenated value : 5185)	Outdoor Sports Activity subtype
	2	Location and Navigation Display Device (concatenated value: 5186)	Outdoor Sports Activity subtype
	3	Location Pod (concatenated value : 5187)	Outdoor Sports Activity subtype
	4	Location and Navigation Pod (concatenated value: 5188)	Outdoor Sports Activity subtype
	5–63	Reserved For Future Use	

Table 3.22: Appearance Characteristic Category and Sub-category fields

3.16 Average Current

3.16.1 Description

This characteristic aggregates the Electric Current characteristic and instance of the Time Exponential 8 characteristic.

3.16.2 Definition

The structure of this characteristic is defined below:

Field	Data Type	Size (in octets)	Description
Electric Current Value	struct	2	Refer to the Electric Current characteristic Section 3.61.
Sensing Duration	struct	1	Refer to the Time Exponential 8 characteristic Section 3.170.

Table 3.23: Structure of the Average Current characteristic

3.17 Average Voltage

3.17.1 Description

This characteristic aggregates the Voltage characteristic and instance of the Time Exponential 8 characteristic.

3.17.2 Definition

The structure of this characteristic is defined below:

Field	Data Type	Size (in octets)	Description
Voltage Value	struct	2	Refer to the Voltage characteristic Section 3.188.
Sensing Duration	struct	1	Refer to the Time Exponential 8 characteristic Section 3.170.

Table 3.24: Structure of the Average Voltage characteristic

3.18 Battery Level

3.18.1 Description

The Battery Level characteristic represents the current charge level of a battery. 100% represents fully charged while 0% represents fully discharged.

3.18.2 Definition

The structure of this characteristic is defined below:

Field	Data Type	Size (in octets)	Description
Battery Level	uint8	1	Base unit: org.bluetooth.unit.percentage. Allowed range is 0 to 100. All other values are reserved for future use.

Table 3.25: Structure of the Battery Level characteristic

3.19 Barometric Pressure Trend

3.19.1 Description

The Barometric Pressure Trend characteristic is used to represent the trend observed for a barometric pressure.

The Barometric Pressure Trend characteristic is a fixed-length structure consisting of a single Barometric Pressure Trend field containing an enumeration.

3.19.2 Definition

The structure of this characteristic is defined below:

Field	Data Type	Size (in octets)	Description
Barometric Pressure Trend	uint8	1	See Section 3.19.2.1

Table 3.26: Structure of the Barometric Pressure Trend characteristic

3.19.2.1 Barometric Pressure Trend field

The enumeration of this field is defined as follows:

Enumeration	Definition
0	Unknown
1	Continuously falling
2	Continuously rising
3	Falling, then steady
4	Rising, then steady
5	Falling before a lesser rise
6	Falling before a greater rise
7	Rising before a greater fall

Enumeration	Definition
8	Rising before a lesser fall
9	Steady
10–255	Reserved for Future Use

Table 3.27: Barometric Pressure Trend field

3.20 Blood Pressure Feature

3.20.1 Description

The Blood Pressure Feature characteristic is used to describe the supported features of the Blood Pressure Sensor.

The Blood Pressure Feature characteristic is a fixed-length structure containing a single Blood Pressure Feature field.

3.20.2 Definition

The structure of this characteristic is defined below:

Field	Data Type	Size (in octets)	Description
Blood Pressure Feature	struct	2	See Section 3.20.2.1.

Table 3.28: Structure of the Blood Pressure Feature characteristic

3.20.2.1 Blood Pressure Feature field

The bits of this field are defined as:

Bit Number	Definition
0	Body Movement Detection Support 0 = Body Movement Detection feature not supported 1 = Body Movement Detection feature supported
1	Cuff Fit Detection Support 0 = Cuff Fit Detection feature not supported 1 = Cuff Fit Detection feature supported
2	Irregular Pulse Detection Support 0 = Irregular Pulse Detection feature not supported 1 = Irregular Pulse Detection feature supported

Bit Number	Definition
3	Pulse Rate Range Detection Support 0 = Pulse Rate Range Detection feature not supported 1 = Pulse Rate Range Detection feature supported
4	Measurement Position Detection Support 0 = Measurement Position Detection feature not supported 1 = Measurement Position Detection feature supported
5	Multiple Bond Support 0 = Multiple Bonds not supported 1 = Multiple Bonds supported
6–15	Reserved for Future Use

Table 3.29: Blood Pressure Feature field

3.21 Blood Pressure Measurement

3.21.1 Description

The Blood Pressure Measurement characteristic is a variable-length structure containing a Flags field and a Blood Pressure Measurement Compound Value field. It may contain additional fields such as Time Stamp, Pulse Rate, and User ID, as determined by the contents of the Flags field.

3.21.2 Definition

The structure of this characteristic is defined below:

Field	Data Type	Size (in octets)	Requirement
Flags	struct	1	See Section 3.21.2.1.
Blood Pressure Measurement Compound Value - Systolic (mmHg) present if Flags field bit 0 = 0.	SFLOAT	0 or 2	Unit: org.bluetooth.unit.pressure.millimetre_of_mercury Note: Field exists if the key of bit 0 of the Flags field is set to 0.
Blood Pressure Measurement Compound Value - Diastolic (mmHg) present if Flags field bit 0 = 0.	SFLOAT	0 or 2	Unit: org.bluetooth.unit.pressure.millimetre_of_mercury Note: Field exists if the key of bit 0 of the Flags field is set to 0.

Field	Data Type	Size (in octets)	Requirement
Blood Pressure Measurement Compound Value - Mean Arterial Pressure (mmHg) Present if Flags field bit 0 = 0.	SFLOAT	0 or 2	Unit: org.bluetooth.unit.pressure.millimetre_of_mercury Note: Field exists if the key of bit 0 of the Flags field is set to 0.
Blood Pressure Measurement Compound Value - Systolic (kPa) Present if Flags field bit 0 = 1	SFLOAT	0 or 2	Base Unit: org.bluetooth.unit.pressure.pascal; Multiplier: 103 Note: Field exists if the key of bit 0 of the Flags field is set to 1.
Blood Pressure Measurement Compound Value - Diastolic (kPa) Present if Flags field bit 0 = 1	SFLOAT	0 or 2	Base Unit: org.bluetooth.unit.pressure.pascal; Multiplier: 103 Note: Field exists if the key of bit 0 of the Flags field is set to 1.
Blood Pressure Measurement Compound Value - Mean Arterial Pressure (kPa) Present if Flags field bit 0 = 1	SFLOAT	0 or 2	Base Unit: org.bluetooth.unit.pressure.pascal; Multiplier: 103 Note: Field exists if the key of bit 0 of the Flags field is set to 1.
Time Stamp Present if Flags field bit 1 = 1	struct	0 or 7	Refer to Date Time characteristic in Section 3.55.
Pulse Rate Present if Flags field bit 2 = 1	SFLOAT	0 or 2	Unit: org.bluetooth.unit.period.beats_per_minute Note: Field exists if the key of bit 2 of the Flags field is set to 1.

Field	Data Type	Size (in octets)	Requirement
User ID Present if Flags field bit 3 = 1	uint8	0 or 1	See Section 3.21.2.2.
Measurement Status Present if Flags field bit 3 = 1	struct	0 or 2	See Section 3.21.2.3.

Table 3.30: Structure of the Blood Pressure Measurement characteristic

3.21.2.1 Flags field

These flags define which data fields are present in the Characteristic value.

The bits of this field are defined as:

Bit	Bit Name
0	Blood Pressure Units Flag 0 = Blood pressure for Systolic, Diastolic and MAP in units of mmHg 1 = Blood pressure for Systolic, Diastolic and MAP in units of kPa
1	Time Stamp Flag 0 = Time Stamp not present 1 = Time Stamp present
2	Pulse Rate Flag 0 = Pulse Rate not present 1 = Pulse Rate present
3	User ID Flag 0 = User ID not present 1 = User ID present
4	Measurement Status Flag 0 = Measurement Status not present 1 = Measurement Status present
5–7	Reserved for Future Use

Table 3.31: Flags field

3.21.2.2 User ID field

This field is an enumeration defined as:

Key	Value
0x00–0xFE	Defined by the service specification
0xFF	Unknown User

Table 3.32: User-ID field

3.21.2.3 Measurement Status field

The bits of this field are defined as:

Bit	Bit Name	Value
0	Body Movement Detection Flag	0 = No body movement 1 = Body movement detected during measurement
1	Cuff Fit Detection Flag	0 = Cuff fits properly 1 = Cuff too loose
2	Irregular Pulse Detection Flag	0 = No irregular pulse detected 1 = Irregular pulse detected
3 and 4	Pulse Rate Range Detection Flags	Enumeration: 0b00: Pulse rate is within the range 0b01: Pulse rate exceeds upper limit 0b10: Pulse rate is less than lower limit 0b11: Reserved for Future Use
5	Measurement Position Detection Flag	0 = Proper measurement position 1 = Improper measurement position
6–15	Reserved for Future Use	

Table 3.33: Measurement Status field

Note: Field exists if the key of bit 4 of the Flags field is set to 1.

3.22 Body Composition Feature

3.22.1 Description

The Body Composition Feature characteristic is used to describe the supported features of the Body Composition Sensor.

The Body Composition Feature characteristic is a fixed-length structure containing a single Body Composition Feature field.

3.22.2 Definition

The structure of this characteristic is defined in Table 3.34.

Field	Data Type	Size (in octets)	Description
Body Composition Feature	struct	4	See 0

Table 3.34: Body Composition Feature characteristic

3.22.2.1 Body Composition Feature field

The bits of this field are defined in Table 3.35.

Bit Number	Definition
0	Time Stamp Supported 0 = False 1 = True
1	Multiple Users Supported 0 = False 1 = True
2	Basal Metabolism Supported 0 = False 1 = True
3	Muscle Percentage Supported 0 = False 1 = True
4	Muscle Mass Supported 0 = False 1 = True
5	Fat Free Mass Supported 0 = False 1 = True
6	Soft Lean Mass Supported 0 = False 1 = True
7	Body Water Mass Supported 0 = False 1 = True
8	Impedance Supported 0 = False 1 = True
9	Weight Supported 0 = False 1 = True

<table>
<tr><th>Bit Number</th><th>Definition</th></tr>
<tr><td>10</td><td>Height Supported
0 = False
1 = True</td></tr>
<tr><td>11–14</td><td>Weight Measurement Resolution
<table>
<tr><th>Bit14</th><th>Bit13</th><th>Bit12</th><th>Bit11</th><th>Definition</th></tr>
<tr><td>0</td><td>0</td><td>0</td><td>0</td><td>Not specified</td></tr>
<tr><td>0</td><td>0</td><td>0</td><td>1</td><td>Resolution of 0.5 kg or 1 lb.</td></tr>
<tr><td>0</td><td>0</td><td>1</td><td>0</td><td>Resolution of 0.2 kg or 0.5 lb.</td></tr>
<tr><td>0</td><td>0</td><td>1</td><td>1</td><td>Resolution of 0.1 kg or 0.2 lb.</td></tr>
<tr><td>0</td><td>1</td><td>0</td><td>0</td><td>Resolution of 0.05 kg or 0.1 lb.</td></tr>
<tr><td>0</td><td>1</td><td>0</td><td>1</td><td>Resolution of 0.02 kg or 0.05 lb.</td></tr>
<tr><td>0</td><td>1</td><td>1</td><td>0</td><td>Resolution of 0.01 kg or 0.02 lb.</td></tr>
<tr><td>0</td><td>1</td><td>1</td><td>1</td><td>Resolution of 0.005 kg or 0.01 lb.</td></tr>
<tr><td>1</td><td>X</td><td>X</td><td>X</td><td>Reserved for Future Use</td></tr>
</table></td></tr>
<tr><td>15–17</td><td>Height Measurement Resolution
<table>
<tr><th>Bit17</th><th>Bit16</th><th>Bit15</th><th>Definition</th></tr>
<tr><td>0</td><td>0</td><td>0</td><td>Not specified</td></tr>
<tr><td>0</td><td>0</td><td>1</td><td>Resolution of 0.01 meter or 1 inch</td></tr>
<tr><td>0</td><td>1</td><td>0</td><td>Resolution of 0.005 meter or 0.5 inch</td></tr>
<tr><td>0</td><td>1</td><td>1</td><td>Resolution of 0.001 meter or 0.1 inch</td></tr>
<tr><td>1</td><td>X</td><td>X</td><td>Reserved for Future Use</td></tr>
</table></td></tr>
<tr><td>18–31</td><td>Reserved for Future Use</td></tr>
</table>

Table 3.35: Body Composition Feature field

3.23 Body Composition Measurement

3.23.1 Description

The Body Composition Measurement characteristic is a variable-length structure containing a Flags field, Body Fat Percentage field, and, based upon the contents of the Flags field, additional fields (See Section 3.23.2).

3.23.2 Definition

The structure of this characteristic is defined in Table 3.36.

Field	Data Type	Size (in octets)	Description
Flags	struct	2	See Section 3.23.2.1
Body Fat Percentage	uint16	2	Base Unit: org.bluetooth.unit.percentage Represented values: M = 1, d = -1, b = 0 Unit is 1/10 of a percent
Time Stamp Present if bit 1 of Flags field set to 1	struct	7	Refer to the Date Time characteristic in Section 3.55
User ID Present if bit 2 of Flags field set to 1	uint8	1	See Section 3.23.2.2
Basal Metabolism Present if bit 3 of Flags field set to 1	uint16	2	Base Unit: org.bluetooth.unit.energy.joule Represented values: M = 1, d = 3, b = 0 Unit is kilojoules
Muscle Percentage Present if bit 4 of Flags field set to 1	uint16	2	Base Unit: org.bluetooth.unit.percentage Represented values: M = 1, d = -1, b = 0 Unit is 1/10 of a percent
Muscle Mass Present if bit 5 of Flags field set to 1	uint16		See Section 3.23.2.3
Fat Free Mass Present if bit 6 of Flags field set to 1	uint16		See Section 3.23.2.4
Soft Lean Mass Present if bit 7 of Flags field set to 1	uint16		See Section 3.23.2.5
Body Water Mass Present if bit 8 of Flags field set to 1	uint16		See Section 3.23.2.6

Field	Data Type	Size (in octets)	Description
Impedance Present if bit 9 of Flags field set to 1	uint16		Base Unit: org.bluetooth.unit.electric_resistance.ohm Represented values: M = 1, d = -2, b = 0 Unit is 1/10 of an Ohm
Weight Present if bit 10 of Flags field set to 1	uint16		See Section 3.23.2.7
Height Present if bit 11 of Flags field set to 1	uint16		See Section 3.23.2.8

Table 3.36: Body Composition Measurement characteristic

3.23.2.1 Flags field

The values of this field are defined in Table 3.37.

Bit Number	Definition
0	Measurement Units: 0 = SI (Weight and Mass in units of kilogram (kg) and Height in units of meter) 1 = Imperial (Weight and Mass in units of pound (lb) and Height in units of inch (in))
1	Time Stamp present: 0 = False 1 = True
2	User ID present: 0 = False 1 = True
3	Basal Metabolism present: 0 = False 1 = True
4	Muscle Percentage present: 0 = False 1 = True
5	Muscle Mass present: 0 = False

Bit Number	Definition
	1 = True
6	Fat Free Mass present: 0 = False 1 = True
7	Soft Lean Mass present: 0 = False 1 = True
8	Body Water Mass present: 0 = False 1 = True
9	Impedance present: 0 = False 1 = True
10	Weight present: 0 = False 1 = True
11	Height present: 0 = False 1 = True
12	Multiple Packet Measurement: 0 = False 1 = True
13–15	Reserved for Future Use

Table 3.37: Flags field

3.23.2.2 User ID field

The special value of 0xFF for User ID represents “unknown user”.

3.23.2.3 Muscle Mass field

This field is in kilograms with resolution 0.005 if the bit 0 of the Flag field is 0 or in pounds with a resolution of 0.01 if the bit 0 of the Flag field is 1.

3.23.2.4 Fat Free Mass field

This field is in kilograms with resolution 0.005 if the bit 0 of the Flag field is 0 or in pounds with a resolution of 0.01 if the bit 0 of the Flag field is 1.

3.23.2.5 Soft Lean Mass field

This field is in kilograms with resolution 0.005 if the bit 0 of the Flag field is 0 or in pounds with a resolution of 0.01 if the bit 0 of the Flag field is 1.

3.23.2.6 Body Water Mass field

This field is in kilograms with resolution 0.005 if the bit 0 of the Flag field is 0 or in pounds with a resolution of 0.01 if the bit 0 of the Flag field is 1.

3.23.2.7 Weight field

This field is in kilograms with resolution 0.005 if the bit 0 of the Flag field is 0 or in pounds with a resolution of 0.01 if the bit 0 of the Flag field is 1.

3.23.2.8 Height field

This field is in meters with a resolution of 0.001 if the bit 0 of the Flag field is 0 or in inches with a resolution of 0.1 if the bit 0 of the Flag field is 1.

3.24 Body Sensor Location

3.24.1 Description

The Body Sensor Location characteristic contains sensor location information.

3.24.2 Definition

The structure of this characteristic is defined in Table 3.38.

Field	Data Type	Size (in octets)	Description
Body Sensor Location	uint8	1	See Section 3.24.2.1

Table 3.38: Body Sensor Location characteristic

3.24.2.1 Body Sensor Location field

The values of this field are defined in Table 3.39.

Key	Value
0x00	Other
0x01	Chest
0x02	Wrist
0x03	Finger
0x04	Hand
0x05	Ear Lobe

Key	Value
0x06	Foot
0x07–0xFF	Reserved for Future Use

Table 3.39: Body Sensor Location field

3.25 Boolean

3.25.1 Description

The Boolean characteristic defines the predefined Boolean values as an enumeration.

3.25.2 Definition

The structure of this characteristic is defined below:

Field	Data Type	Size (in octets)	Description
Boolean	uint8	1	See Section 3.25.2.1

Table 3.40: Structure of the Boolean characteristic

3.25.2.1 Boolean field

The enumeration of the Boolean field is defined as follows:

Enumeration	Definition
0	False
1	True
2–255	Prohibited

Table 3.41: Boolean field

3.26 CGM Feature

3.26.1 Description

The CGM Feature characteristic contains the information about the supported features.

3.26.2 Definition

The structure of the CGM Feature characteristic is defined below:

Field	Data Type	Size (in octets)	Description
CGM Feature	struct	3	See Section 3.26.2.1
	nibble	1	See Section 3.26.2.2

Field	Data Type	Size (in octets)	Description
CGM Type-Sample Location	nibble		
E2E-CRC	uint16	2	See Section 3.26.2.3

Table 3.42: Structure of CGM Feature characteristic

3.26.2.1 CGM Feature field

The bits of this field are defined as follows:

Bit number	Definition
0	Calibration supported
1	Patient High/Low Alerts supported
2	Hypo Alerts supported
3	Hyper Alerts supported
4	Rate of Increase/Decrease Alerts supported
5	Device Specific Alert supported
6	Sensor Malfunction Detection supported
7	Sensor Temperature High-Low Detection supported
8	Sensor Result High-Low Detection supported
9	Low Battery Detection supported
10	Sensor Type Error Detection supported
11	General Device Fault supported
12	E2E-CRC supported
13	Multiple Bond supported
14	Multiple Sessions supported
15	CGM Trend Information supported
16	CGM Quality supported
17–23	Reserved for Future Use

Table 3.43: CGM Feature

Note: The bits in the table above are defined as: 0 = False and 1 = True

3.26.2.2 CGM Type-Sample Location field

The CGM Type-Sample Location field is an 8-bit field, comprised of two fields, each a 4-bit nibble, where the least significant nibble contains the Type and the most significant nibble contains the Sample Location. These two nibbles are packed as one single octet, the Least Significant Nibble means the four bits numbered 0, 1, 2, and 3 of the octet, and the Most Significant Nibble means the four bits numbered 4, 5, 6, and 7 of that octet

The structure of this field is defined below:

	Type	Sample Location
Byte Order	LSN	MSN
Data type	4-bit	4-bit
Size	1 nibble	1 nibble
Units	None	None

Table 3.44: Type Sample Location

Where LSN = Least Significant Nibble and MSN = Most Significant Nibble.

The following values are defined for the Type field:

Description	Value
Reserved for Future Use	0x0
Capillary Whole blood	0x1
Capillary Plasma	0x2
Venous Whole blood	0x3
Venous Plasma	0x4
Arterial Whole blood	0x5
Arterial Plasma	0x6
Undetermined Whole blood	0x7
Undetermined Plasma	0x8
Interstitial Fluid (ISF)	0x9
Control Solution	0xA
Reserved for Future Use	0xB–0xF

Table 3.45: Type

The following values are defined for the Sample Location field:

Description	Value
Reserved for Future Use	0x0
Finger	0x1
Alternate Site Test (AST)	0x2
Earlobe	0x3
Control solution	0x4
Subcutaneous tissue	0x5
Reserved for Future Use	0x6–0xE
Sample Location value not available	0xF

Table 3.46: Sample Location

3.26.2.3 E2E-CRC field

If the device supports E2E-safety (E2E-CRC Supported bit is set in CGM Feature), the feature security is provided by a CRC calculated over all data, but the E2E-CRC field itself, see Section 2.3 for details. This field is mandatory in this characteristic. If the device does not support E2E-safety the value of the field shall be set to 0xFFFF.

3.27 CGM Measurement

3.27.1 Description

The CGM Measurement characteristic is a variable-length structure containing one or more CGM Measurement records, each comprising a Size field, a Flags field, a Glucose Concentration field, a Time Offset field, a Sensor Status Annunciation field (optional), a CGM Trend Information field (optional), a CGM Quality field (optional), and an E2E-CRC field (mandatory if this feature is supported).

The presence of the CGM Trend Information field and the CGM Quality field are dependent on the Flags field value, the CGM Trend Information Supported bit and CGM Quality Supported bit in CGM Feature.

The presence of the octets of the Sensor Status Annunciation field are dependent on the Flags field value.

The presence of the E2E-CRC field depends on the E2E-CRC Supported bit in CGM Feature only.

The minimum length of one CGM Measurement record is 6 octets and the maximum length of one record is 15 octets.

3.27.2 Definition

The structure of a CGM Measurement Record is defined below:

Field	Data Type	Size (in octets)	Description
Size	uint8	1	See Section 3.27.2.1
Flags	struct	1	See Section 3.27.2.2

Field	Data Type	Size (in octets)	Description
CGM Glucose Concentration	SFLOAT	2	See Section 3.27.2.3 unit: org.bluetooth.unit.mass_density.milligram_per_decilitre
Time Offset	uint16	2	See Section 3.27.2.4 unit: org.bluetooth.unit.time.minute
Sensor Status Annunciation (Status Octet) Present if Flags field bit 7 = 1	struct	0 or 1	See Section 3.27.2.5
Sensor Status Annunciation (Cal-Temp Octet) Present if Flags field bit 6 = 1	struct	0 or 1	See Section 3.27.2.5
Sensor Status Annunciation (Warning Octet) Present if Flags field bit 5 = 1	struct	0 or 1	See Section 3.27.2.5
CGM Trend Information Present if Flags field bit 0 = 1	SFLOAT	0 or 2	See Section 3.27.2.6 unit: org.bluetooth.unit.mass_density.milligram_per_decilitre / org.bluetooth.unit.time.minute
CGM Quality Present if Flags field bit 1 = 1	SFLOAT	0 or 2	See Section 3.27.2.7 unit: org.bluetooth.unit.percentage
E2E-CRC Present if E2E-CRC Supported bit in CGM Feature characteristic = 1	uint16	0 or 2	See Section 3.27.2.8

Table 3.47: Structure of a CGM Measurement Record

Note: If the Characteristic value is notified in a protocol date unit (PDU) comprising multiple CGM Measurement records, this PDU would appear as follows:

PDU Op Code	Handle	Value1	Value2	…	Value N
1 octet	2 octet	Length1 octet	Length2 octet	…	Length N octet

Table 3.48: PDU

Assuming the minimum length of 6 octets for each record, 3 records fit in a default ATT MTU size of 23. However, as the maximum transmission unit (MTU) increases, more records can be packed in the same PDU. If the number of records that can be transferred is fixed in the Characteristic, the service will not be able to benefit from larger MTU systems.

3.27.2.1 Size field

The Size field represents the size of the CGM Measurement record. The minimum size is 6 octets and is enlarged by more octets indicated by the Flags field (Sensor Status Annunciation field, CGM Trend Information field, and CGM Quality field) and the E2E-CRC Supported bit in CGM Feature. The Size field itself is included in the overall length calculation.

3.27.2.2 Flags field

The bits of this field are defined as:

Bit	Definition
0	CGM Trend Information present
1	CGM Quality present
2	Reserved for Future Use
3	Reserved for Future Use
4	Reserved for Future Use
5	Sensor Status Annunciation field, Warning-Octet present
6	Sensor Status Annunciation field, Cal/Temp-Octet present
7	Sensor Status Annunciation field, Status-Octet present

Table 3.49: Flags field

Note: The bits in the table above are defined to: 0 = False and 1 = True

3.27.2.3 CGM Glucose Concentration

The CGM Glucose Concentration field contains the Continuous Glucose Monitoring (CGM) glucose concentration in mg/dL as a SFLOAT data type as defined in [2]. The SFLOAT-Type is a 16-bit word comprising a signed 4-bit integer exponent followed by a signed 12-bit mantissa, each in two's-complement form.

3.27.2.4 Time Offset

The following values are defined for the Time Offset field, specifying the relative time difference of the single CGM values to the session start time.

Description	Value
Time offset in minutes as offset to the Session Start Time	0x0000–0xFFFF

Table 3.50: Time Offset field

3.27.2.5 Sensor Status Annunciation field

The Sensor Status Annunciation field is an optional field comprising up to three octets. It is only attached if one or more bits are set to “1”. Only the affected octet(s) shall be added and indicated by the Flags field. The Sensor Status Annunciation field shall be attached to every CGM Measurement Record to which the status applies.

Bit	Octet	Bit Position in Octet	Definition
0	Status	0	Session stopped
1	Status	1	Device battery low
2	Status	2	Sensor type incorrect for device
3	Status	3	Sensor malfunction
4	Status	4	Device Specific Alert
5	Status	5	General device fault has occurred in the sensor
6	Status	6	Reserved for Future Use
7	Status	7	Reserved for Future Use
8	Cal/Temp	0	Time synchronization between sensor and collector required
9	Cal/Temp	1	Calibration not allowed
10	Cal/Temp	2	Calibration recommended
11	Cal/Temp	3	Calibration required
12	Cal/Temp	4	Sensor temperature too high for valid test/result at time of measurement
13	Cal/Temp	5	Sensor temperature too low for valid test/result at time of measurement
14	Cal/Temp	6	Reserved for Future Use
15	Cal/Temp	7	Reserved for Future Use
16	Warning	0	Sensor result lower than the Patient Low level
17	Warning	1	Sensor result higher than the Patient High level
18	Warning	2	Sensor result lower than the Hypo level

Bit	Octet	Bit Position in Octet	Definition
19	Warning	3	Sensor result higher than the Hyper level
20	Warning	4	Sensor Rate of Decrease exceeded
21	Warning	5	Sensor Rate of Increase exceeded
22	Warning	6	Sensor result lower than the device can process
23	Warning	7	Sensor result higher than the device can process

Table 3.51: Sensor Status Annunciation field

Note: The bits in the table above are defined to: 0 = False and 1 = True

There shall be only an octet attached where at least one bit is set to “1”, e.g.:

If Bit 17 is set to “1” and all other Bits are set to “0”, the Warning-Octet is attached to the CGM Measurement Record and Bit 5 of Flags field is set to “1”, announcing the presence of the Warning-Octet of the Sensor Status Annunciation field.

If Bit 3, Bit 12, and Bit 17 are set to “1”, then the Status-Octet, Cal/Temp-Octet, and Warning-Octet of the Sensor Status Annunciation field are attached to the CGM Measurement Record and Bit 5, Bit 6, and Bit 7 of the Flags field are set to “1”, announcing the presence of Status-Octet, Cal/Temp-Octet, and Warning-Octet of the Sensor Status Annunciation field.

3.27.2.6 CGM Trend Information field

The CGM Trend Information field contains the CGM Trend information in (mg/dL)/min as an SFLOAT data type as defined in [2]. This field is optional if the device supports CGM Trend information (Bit 15 in CGM Feature is set to 1), otherwise excluded.

3.27.2.7 CGM Quality field

This field contains the CGM Quality information in % as an SFLOAT data type as defined in [2]. The SFLOAT-Type is a 16-bit word comprising a signed 4-bit integer exponent followed by a signed 12-bit mantissa, each in two’s-complement form. This field is optional if the device supports CGM Quality (Bit 16 in CGM Feature is set to 1), otherwise excluded.

3.27.2.8 E2E-CRC field

If the device supports E2E-safety (E2E-CRC Supported bit is set in CGM Feature), the measurement security is provided by a CRC calculated over all fields, except the E2E-CRC field itself. This field is mandatory if the device supports E2E-CRC (Bit 12 in CGM Feature is set to 1), otherwise excluded. See Section 2.3 for details.

3.28 CGM Session Run Time

3.28.1 Description

The CGM Session Run Time characteristic contains the expected run time of the CGM session.

3.28.2 Definition

The structure of this characteristic is defined below:

Field	Data Type	Size (in octets)	Description
CGM Session Run Time	uint16	2	See Section 3.28.2.1 unit: org.bluetooth.unit.time.hour
E2E-CRC Present if E2E-CRC Supported bit in CGM Feature characteristic = 1	uint16	0 or 2	See Section 3.28.2.2

Table 3.52: Structure of CGM Session Run Time characteristic

3.28.2.1 CGM Session Run Time field

The CGM Session Run Time field represents the expected run time of the CGM session in hours.

Typically CGM sensors have a limited run time for which they are approved by regulatory bodies. However this characteristic is intended to enable a prediction of the run time depending on physiological effects in future devices.

3.28.2.2 E2E-CRC field

If the device supports E2E-safety (E2E-CRC Supported bit is set in CGM Feature), the session run time security is provided by a CRC calculated over all fields. See Section 2.3 for details.

3.29 CGM Session Start Time

3.29.1 Description

The CGM Session characteristic contains the time the CGM session is started.

3.29.2 Definition

The structure of this characteristic is defined below:

Field	Data Type	Size (in octets)	Description
Session Start Time	struct	7	Refer to the Date Time characteristic in Section 3.55
Time Zone	uint8	1	Refer to the Time Zone characteristic in Section 3.179
DST Offset	uint8	1	Refer to the DST Offset characteristic in Section 3.60
E2E-CRC Present if E2E-CRC Supported bit in CGM Feature characteristic = 1	uint16	0 or 2	See Section 3.29.2.1

Table 3.53: Structure of CGM Session Start Time characteristic

3.29.2.1 E2E-CRC field

If the device supports E2E-safety (E2E-CRC Supported bit is set in CGM Feature), the session start time security is provided by a CRC calculated over all fields. See Section 2.3 for details.

3.30 CGM Specific Ops Control Point

3.30.1 Description

The CGM Specific Ops Control Point encapsulates all functionality and mechanisms that are unique to a CGM device.

This control point is used with a service to provide CGM-specific functionality and the ability to change CGM-specific settings of the device. This includes functions like setting the CGM Communication Interval or the sending a calibration value to the device. The criterion in the Operand field is defined by the service that references this characteristic.

3.30.2 Definition

The structure of this characteristic is defined below:

Field	Data Type	Size (in octets)	Description
Op Code	uint8	1	See Section 3.30.2.1
Operand	struct	0 … 17	See Section 3.30.2.1
E2E-CRC Present if E2E-CRC Supported bit in CGM Feature characteristic = 1	uint16	0 or 2	See Section 3.30.2.4

Table 3.54: Structure of the CGM Specific Ops Control Point characteristic

3.30.2.1 Op Code and Operand field

The values of these fields are defined as:

Op Code Value	Definition	Operand	Operand Data Type	Description
0x00	Reserved for Future Use	N/A	N/A	N/A
0x01	Set CGM Communication Interval	Communication interval in minutes	uint8	The response to this control point is *Response Code* (Op Code 0x0F).
0x02	Get CGM Communication Interval	N/A	N/A	The normal response to this control point is Op Code 0x03. For error conditions, the response is *Response Code*. as defined in Table 3.56.
0x03	CGM Communication Interval response	Communication Interval in minutes	uint16	This is the normal response to Op Code 0x02.

Op Code Value	Definition	Operand	Operand Data Type	Description
0x04	Set Glucose Calibration value	Operand as defined below. (see Section 3.30.2.3)	See Section 3.30.2.3	The response to this control point is *Response Code*.
0x05	Get Glucose Calibration Value	Calibration Data Record Number	uint16	The normal response to this control point is Op Code 0x06. For error conditions, the response is *Response Code*.
0x06	Glucose Calibration Value response	Calibration Data	See Section 3.30.2.3	This is the normal response to Op Code 0x05.
0x07	Set Patient High Alert Level	Patient High bG value in mg/dL	SFLOAT	The response to this control point is *Response Code*.
0x08	Get Patient High Alert Level	N/A	N/A	The normal response to this control point is Op Code 0x09. For error conditions, the response is *Response Code*.
0x09	Patient High Alert Level Response	Patient High bG value in mg/dL	SFLOAT	This is the normal response to Op Code 0x08.
0x0A	Set Patient Low Alert Level	Patient Low bG value in mg/dL	SFLOAT	The response to this control point is *Response Code*.
0x0B	Get Patient Low Alert Level	N/A	N/A	The normal response to this control point is Op Code 0x0C. For error conditions, the response is *Response Code*.
0x0C	Patient Low Alert Level Response	Patient Low bG value in mg/dL	SFLOAT	This is the normal response to Op Code 0x0B.
0x0D	Set Hypo Alert Level	Hypo Alert Level value in mg/dL	SFLOAT	The response to this control point is *Response Code*.
0x0E	Get Hypo Alert Level	N/A	N/A	The normal response to this control point is Op Code 0x0F. For error conditions, the response is *Response Code*.

Op Code Value	Definition	Operand	Operand Data Type	Description
0x0F	Hypo Alert Level Response	Hypo Alert Level value in mg/dL	SFLOAT	This is the normal response to Op Code 0x0E.
0x10	Set Hyper Alert Level	Hyper Alert Level value in mg/dL	SFLOAT	The response to this control point is *Response Code*.
0x11	Get Hyper Alert Level	N/A	N/A	The normal response to this control point is Op Code 0x12. For error conditions, the response is *Response Code*.
0x12	Hyper Alert Level Response	Hyper Alert Level value in mg/dL	SFLOAT	This is the normal response to Op Code 0x11.
0x13	Set Rate of Decrease Alert Level	Rate of Decrease Alert Level value in mg/dL/min	SFLOAT	The response to this control point is *Response Code*.
0x14	Get Rate of Decrease Alert Level	N/A	N/A	The normal response to this control point is Op Code 0x15. For error conditions, the response is *Response Code*.
0x15	Rate of Decrease Alert Level Response	Rate of Decrease Alert Level value in mg/dL/min	SFLOAT	This is the normal response to Op Code 0x14.
0x16	Set Rate of Increase Alert Level	Rate of Increase Alert Level value in mg/dL/min	SFLOAT	The response to this control point is *Response Code.*
0x17	Get Rate of Increase Alert Level	N/A	N/A	The normal response to this control point is Op Code 0x18. For error conditions, the response is *Response Code*.
0x18	Rate of Increase Alert Level Response	Rate of Increase Alert Level value in mg/dL/min	SFLOAT	This is the normal response to Op Code 0x17.
0x19	Reset Device Specific Alert	N/A	N/A	The response to this control point is *Response Code*.
0x1A	Start the Session	N/A	N/A	The response to this control point is *Response Code*.

Op Code Value	Definition	Operand	Operand Data Type	Description
0x1B	Stop the Session	N/A	N/A	The response to this control point is *Response Code*.
0x1C	Response Code	Request Op Code, Response Code Value	N/A	See Response Code Values Table.
0x1D–0xFF	Reserved for Future Use	N/A	N/A	N/A

Table 3.55: Op Code and Operand field

3.30.2.2 Response Code Values

The following Response Code Values are associated with the CGM Specific Ops Control Point:

Response Code Value	Definition	Description
0x00	Reserved For Future Use	N/A
0x01	Success	Normal response for successful operation.
0x02	Op Code not supported	Normal response if unsupported Op Code is received.
0x03	Invalid Operand	Normal response if Operand received does not meet the requirements of the service.
0x04	Procedure not completed	Normal response if unable to complete a procedure for any reason.
0x05	Parameter out of range	Normal response if Operand received does not meet the range requirements
0x06–0xFF	Reserved for Future Use	N/A

Table 3.56: CGM Specific Ops Control Point Response Code Values

3.30.2.3 Calibration Value

The Operand which is used for setting and getting the calibration value is described in the following table:

LSO MSO

	Glucose Concentration of Calibration	Calibration Time	Calibration Type-Sample Location		Next Calibration Time	Calibration Data Record Number	Calibration Status
Byte Order	LSO…MSO	LSO…MSO	N/A		LSO…MSO	LSO…MSO	N/A
Data type	SFLOAT	uint16	4-bit	4-bit	uint16	uint16	8-bit

	Glucose Concentration of Calibration	Calibration Time	Calibration Type-Sample Location	Next Calibration Time	Calibration Data Record Number	Calibration Status
Size	2 octets	2 octets	1 octet	2 octets	2 octets	1 octet
Units	mg/dL	minutes	None	minutes	N/A	N/A

Table 3.57: Calibration Value Operand

Where LSO = Least Significant Octet and MSO = Most Significant Octet.

Glucose Concentration of Calibration field

The Glucose Concentration field is a SFLOAT as defined in [1] and contains the glucose value of the calibration in the unit mg/dL.

Calibration Time field

The Calibration Time field contains the calibration time in minutes as described below.

Description	Value
Calibration Time in minutes as offset to the Session Start Time	0x0000–0xFFFF

Table 3.58: Calibration Time field

Calibration Type-Sample Location field

Each calibration value shall be accompanied by a type-sample location field that shall be identical to the CGM Type-Sample Location field, as defined in Section 3.26.2.2.

Next Calibration Time field

The Next Calibration Time field contains the next calibration time in minutes as described below.

Description	Value
Next Calibration Time in minutes as offset to the Session Start Time	0x0000–0xFFFF

Table 3.59: Next Calibration Time field

Calibration Data Record Number field

The Calibration Data Record Number field contains the index of the calibration values, starting with 1 for the initial (first) calibration. A get operation with operand 0xFFFF will return the last Calibration Data Record Number. A value of “0” represents no calibration value stored.

The fields in the Calibration Data Record number 0 shall be set to the following values: Glucose Concentration of Calibration = NaN, Calibration Time = 0, Calibration Data Record Number = 0, for all other fields it is left to implementation.

If the Calibration Data Record will be set, the data in the Calibration Data Record Number will be ignored. This field will contain later on the index of the Calibration Data Record.

Calibration Status field

The Calibration Status field contains the result of the calibration procedure of the Sensor related to the specific Calibration Data Record. If the Calibration Data Record will be set, the data in the Calibration Status field will be ignored.

Bit	Definition
0	Calibration Data rejected (Calibration failed)
1	Calibration Data out of range
2	Calibration Process Pending
3–7	Reserved for Future Use

Table 3.60: Calibration Status

Note: The bits in the table above are defined as: 0 = False and 1 = True

The Calibration Process running on the server may need some time to finish. To make the Collector aware of this situation the Sensor shall set the Calibration Process Pending bit in the Calibration Status field.

3.30.2.4 E2E-CRC field

If the device supports E2E-safety (E2E-CRC Supported bit is set in CGM Feature), the specific ops control point security is provided by a CRC calculated over all fields, but the E2E-CRC field itself. See Section 2.3 for details.

3.31 CGM Status

3.31.1 Description

The CGM Status characteristic allows the Collector to actively request the current status from the CGM sensor, particularly when the CGM measurement is not running and the status cannot be given in the measurement result in the Status Annunciation.

3.31.2 Definition

The structure of the CGM Status field is defined below:

Field	Data Type	Size (in octets)	Description
Time Offset	uint16	2	The Time Offset field shall specify the actual relative time difference to the session start time.
CGM Status	struct	3	The structure of the CGM Status field shall be identical to the structure of the Status Annunciation field, as defined in Section 3.27.2.5, but it always consists of three octets regardless the value.

Field	Data Type	Size (in octets)	Description
E2E-CRC Present if E2E-CRC Supported bit in CGM Feature characteristic = 1	uint16	0 or 2	If the device supports E2E-safety (E2E-CRC Supported bit is set in CGM Feature), the status security is provided by a CRC calculated over all fields, but the E2E-CRC field itself. See Section 2.3 for details.

Table 3.61: Structure of CGM Status characteristic

3.32 Chromatic Distance From Planckian

3.32.1 Description

The Chromatic Distance From Planckian characteristic represents a distance of a chromaticity coordinate from the Planckian locus in the (u′, 2/3v′) diagram as defined by ANSI standard C78.377-2008.

The distance is positive if the chromaticity coordinate is located above the Planckian locus (i.e. has a higher y value than the Planckian), and negative if it is located below.

The distance is only valid within the range from -0.05 to 0.05.

3.32.2 Definition

The structure of this characteristic is defined below:

Field	Data Type	Size (in octets)	Description
Distance From Planckian	sint16	2	Unit is unitless with a resolution of 0.00001. Minimum: -0.05 Maximum: 0.05 Represented values: M = 1, d = -5, b = 0 A value of 0xFFFF represents 'value is not known'. A value of 0xFFFE represents 'value is not valid'.

Table 3.62: Structure of the Distance From Planckian characteristic

3.33 Chromaticity Coordinate

3.33.1 Description

This characteristic represents a chromaticity coordinate in a color diagram such as the CIE1931 diagram. It can represent an x or y coordinate.

3.33.2 Definition

The structure of this characteristic is defined below:

Field	Data Type	Size (in octets)	Description
Chromaticity Coordinate	uint16	2	Unit is unitless with a resolution of 1/65535 Minimum: 0 Maximum: 1.0 Represented values: M = 1, d = -16, b = 0

Table 3.63: Structure of the Chromaticity Coordinate characteristic

3.34 Chromaticity Coordinates

3.34.1 Description

This characteristic represents a chromaticity coordinate as a tuple with an x and y coordinate.

3.34.2 Definition

The structure of this characteristic is defined below:

Field	Data Type	Size (in octets)	Description
Chromaticity x-coordinate	struct	2	Refer to the Chromaticity Coordinate characteristic in Section 3.33
Chromaticity y-coordinate	struct	2	Refer to the Chromaticity Coordinate characteristic in Section 3.33

Table 3.64: Structure of the Chromaticity Coordinate characteristic

3.35 Chromaticity In CCT And Duv Values

3.35.1 Description

The Chromaticity In CCT And Duv Values characteristic is a composite characteristic consisting of the Correlated Color Temperature characteristic and the Chromatic Distance From Planckian characteristic.

3.35.2 Definition

The structure of this characteristic is defined below:

Field	Data Type	Size (in octets)	Description
Correlated Color Temperature	struct	2	Refer to the Correlated Color Temperature characteristic in Section 3.40
Chromaticity Distance from Planckian	struct	2	Refer to the Chromatic Distance From Planckian characteristic in Section 3.32

Table 3.65: Structure of the Chromaticity In CCT And Duv Values characteristic

3.36 Chromaticity Tolerance

3.36.1 Description

The Chromaticity Tolerance characteristic is a tolerance of a tuple of chromaticity values represented as a value of a radius of a circle in the CIE 1976 (u',v') diagram; value corresponding to the 3-sigma values of the expected chromaticity deviations.

3.36.2 Definition

The structure of this characteristic is defined below:

Field	Data Type	Size (in octets)	Description
Chromaticity Tolerance	uint8	1	Unit is unitless with a resolution of 0.0001 Minimum: 0 Maximum: 0.0255 Represented values: M = 1, d = -4, b = 0

Table 3.66: Structure of the Chromaticity Tolerance characteristic

3.37 CIE 13.3-1995 Color Rendering Index

3.37.1 Description

The CIE 13.3-1995 Color Rendering Index characteristic is a color rendition index value for a color patch as calculated in accordance with the CIE 13.3-1995 standard.

3.37.2 Definition

The structure of this characteristic is defined below:

Field	Data Type	Size (in octets)	Description
Color Rendering Index	sint8	1	Unit is unitless with a resolution of 1. Minimum: -128 Maximum: 100 Represented values: M = 1, d = 0, b = 0

Table 3.67: Structure of the CIE 13.3-1995 Color Rendering Index characteristic

3.38 CO_2 Concentration

3.38.1 Description

The CO_2 Concentration characteristic is used to represent a measure of carbon dioxide concentration in units of parts per million.

3.38.2 Definition

The structure of this characteristic is defined below:

Field	Data Type	Size (in octets)	Description
CO_2 Concentration	uint16	2	Unit is parts per million (ppm) with a resolution of 1. Unit: org.bluetooth.unit.ppm Represented values: M = 1, d = 0, b =0 Allowed range is: 0 to 65533. A value of 0xFFFE represents ‘value is 65534 or greater’. A value of 0xFFFF represents ‘value is not known.

Table 3.68: Structure of the CO_2 Concentration characteristic

3.39 Coefficient

3.39.1 Description

The Coefficient characteristic is used to represent a general coefficient value.

3.39.2 Definition

The structure of this characteristic is defined below:

Field	Data Type	Size (in octets)	Description
Coefficient	float32	4	Unit is unitless.

Table 3.69: Structure of the Coefficient characteristic

3.40 Correlated Color Temperature

3.40.1 Description

The Correlated Color Temperature characteristic is used to represent correlated color temperature in a range from 800 to 65534 Kelvin with a resolution of 1 Kelvin.

3.40.2 Definition

The structure of this characteristic is defined below:

Field	Data Type	Size (in octets)	Description
Correlated Color Temperature	uint16	2	Unit is Kelvin with a resolution of 1. Minimum: 800 Maximum: 65534 Unit: org.bluetooth.unit.thermodynamic_temperature.kelvin A value of 0xFFFF represents 'value is not known'.

Table 3.70: Structure of the Correlated Color Temperature characteristic

3.41 Cosine Of The Angle

3.41.1 Description

The Cosine Of The Angle characteristic represents a value of cosine of the angle.

3.41.2 Definition

The structure of this characteristic is defined below:

Field	Data Type	Size (in octets)	Description
Cosine Of The Angle	sint8	1	This is unitless value, expressed as Cos (o)/100, with a resolution of 1. Unit: org.bluetooth.unit.unitless Allowed range is -100 to 100. A raw value of 0x7F represents 'value is not known'. All other values are prohibited.

Table 3.71: Structure of the Cosine Of The Angle characteristic

3.42 Count 16

3.42.1 Description

The Count 16 characteristic is used to represent a general count value.

3.42.2 Definition

The structure of this characteristic is defined below:

Field	Data Type	Size (in octets)	Description
Count	uint16	2	Unit is unitless with a resolution of 1. Minimum: 0 Maximum: 65534 Represented values: M = 1, d = 0, b = 0 A value of 0xFFFF represents 'value is not known'.

Table 3.72: Structure of the Count 16 characteristic

3.43 Count 24

3.43.1 Description

The Count 24 characteristic is used to represent a general count value.

3.43.2 Definition

The structure of this characteristic is defined below:

Field	Data Type	Size (in octets)	Description
Count	uint24	3	Unit is unitless with a resolution of 1. Minimum: 0 Maximum: 16777214 Represented values: M = 1, d = 0, b = 0 A value of 0xFFFFFF represents 'value is not known'.

Table 3.73: Structure of the Count 24 characteristic

3.44 Country Code

3.44.1 Description

This characteristic represents a country or dependent areas in accordance with the ISO 3166-1 Numeric standard.

3.44.2 Definition

The structure of this characteristic is defined below:

Field	Data Type	Size (in octets)	Description
Country Code	uint16	2	Unit is unitless with a resolution of 1. Minimum: 0 Maximum: 4095 Represented values: M = 1, d = 0, b = 0 A value of 0xFFFF represents 'value is not known'.

Table 3.74: Structure of the Country Code characteristic

3.45 CSC Feature

3.45.1 Description

The CSC Feature characteristic is used to describe the supported features of the Cycling Speed and Cadence sensor.

The CSC Feature characteristic is a fixed-length structure containing a single CSC Feature field.

3.45.2 Definition

The structure of this characteristic is defined in Table 3.75.

Field	Data Type	Size (in octets)	Description
CSC Feature	struct	2	See Section 3.45.2.1

Table 3.75: CSC Feature characteristic

3.45.2.1 CSC Feature field

The bits of this field are defined in Table 3.76.

Bit Number	Definition
0	Wheel Revolution Data Supported 0 = False 1 = True
1	Crank Revolution Data Supported 0 = False 1 = True
2	Multiple Sensor Locations Supported 0 = False 1 = True
3–15	Reserved for Future Use

Table 3.76: CSC Feature field

3.46 CSC Measurement

3.46.1 Description

The CSC Measurement characteristic is a variable-length structure containing a Flags field and, based upon the contents of the Flags field, may contain additional fields shown in Section 3.46.2.

3.46.2 Definition

The structure of this characteristic is defined in Table 3.77.

Field		Data Type	Size (in octets)	Description
Flags		struct	1	See Section 3.46.2.1
Wheel Revolution Data	Cumulative Wheel Revolutions	uint32	4	Unit: org.bluetooth.unitless

Field		Data Type	Size (in octets)	Description
Present if bit 0 of Flags field set to 1	Last Wheel Event Time	uint16	2	Base Unit: org.bluetooth.unit.time.second Represented values: M = 1, d = 0, b = -10 Unit is 1/1024th of a second
Crank Revolution Data	Cumulative Crank Revolutions	uint16	2	Unit: org.bluetooth.unitless
Present if bit 1 of Flags field set to 1	Last Crank Event Time	uint16	2	Base Unit: org.bluetooth.unit.time.second Represented values: M = 1, d = 0, b = -10 Unit is 1/1024 second

Table 3.77: CSC Measurement characteristic

3.46.2.1 Flags field

The values of this field are defined in Table 3.78.

Bit Number	Definition
0	Wheel Revolution Data Present: 0: False 1: True
1	Crank Revolution Data Present 0: False 1: True
2–7	Reserved for Future Use

Table 3.78: Flags field

3.47 Current Time

3.47.1 Description

This characteristic aggregates the exact time and a reason for adjustment.

3.47.2 Definition

The structure of this characteristic is defined below:

Field	Data Type	Size (in octets)	Description
Exact Time 256	struct	9	Refer to the Exact Time 256 characteristic in Section 3.66
Adjust Reason	uint8	1	See Section 3.60.2.1

Table 3.79: Structure of the Current Time characteristic

3.47.2.1 Adjust Reason field

This field represents reason(s) for adjusting time.

The bits of this field are defined as:

Bit	Bit Name
0	Manual Time Update
1	External Reference Time Update
2	Change of Time Zone
3	Change of DST
4–7	Reserved for Future Use

Table 3.80: Adjust Reason field

3.48 Cycling Power Control Point

3.48.1 Description

The Cycling Power Control Point characteristic is used to request a specific function to be executed on the receiving device.

3.48.2 Definition

The structure of this characteristic is defined in Table 3.81.

Field	Data Type	Size (in octets)	Description
Op Code	uint8	1	See Section 3.48.2.1
Parameter	struct	0–18	See Section 3.48.2.1

Table 3.81: Cycling Power Control Point characteristic

3.48.2.1 Op Code and Parameter field

The values of these fields are defined in Table 3.82.

Op Code Value	Definition	Parameter	Parameter Type	Description
0x00	Reserved for Future Use	N/A	N/A	N/A

Op Code Value	Definition	Parameter	Parameter Type	Description
0x01	Set Cumulative Value	Cumulative Value as defined per service	Defined per service	Initiate the procedure to set a cumulative value. The new value is sent as parameter following op code (parameter defined per service). The response to this control point is Op Code 0x20 followed by the appropriate Response Value.
0x02	Update Sensor Location	Sensor Location Value as defined per Service	uint8	Update to the location of the sensor with the value sent as parameter to this op code. The response to this control point is Op Code 0x20 followed by the appropriate Response Value.
0x03	Request Supported Sensor Locations	N/A	N/A	Request a list of supported locations where the sensor can be attached. The response to this control point is Op Code 0x20 followed by the appropriate Response Value, including a list of supported sensor locations in the Response Parameter.
0x04	Set Crank Length	Crank Length Value (defined per Service)		Initiate the procedure to set the crank length value to Sensor. The new value is sent as a parameter with preceding Op Code 0x04 operand. The response to this control point is Op Code 0x20 followed by the appropriate Response Value.
0x05	Request Crank Length			Request the current crank length value set in the Sensor. The response to this control point is Op Code 0x20 followed by the appropriate Response Value, including the value of the crank length in the Response Parameter.
0x06	Set Chain Length	Chain Length Value (defined per Service)		Initiate the procedure to set the chain length value to Sensor. The new value is sent as a parameter with preceding Op Code 0x06 operand. The response to this control point is Op Code 0x20 followed by the appropriate Response Value.

Op Code Value	Definition	Parameter	Parameter Type	Description
0x07	Request Chain Length			Request the current chain length value set in the Sensor. The response to this control point is Op Code 0x20 followed by the appropriate Response Value, including the value of the chain length in the Response Parameter.
0x08	Set Chain Weight	Chain Weight Value (defined per Service)		Initiate the procedure to set the chain weight value to Sensor. The new value is sent as a parameter with preceding Op Code 0x08 operand. The response to this control point is Op Code 0x20 followed by the appropriate Response Value.
0x09	Request Chain Weight			Request the current chain weight value set in the Sensor. The response to this control point is Op Code 0x20 followed by the appropriate Response Value, including the value of the chain weight in the Response Parameter.
0x0A	Set Span Length	Span Length Value (defined per Service)		Initiate the procedure to set the span length value to Sensor. The new value is sent as a parameter with preceding Op Code 0x0A operand. The response to this control point is Op Code 0x20 followed by the appropriate Response Value.
0x0B	Request Span Length			Request the current span length value set in the Sensor. The response to this control point is Op Code 0x20 followed by the appropriate Response Value, including the value of the span length in the Response Parameter.
0x0C	Start Offset Compensation			Starts the offset compensation process of the Sensor. The response to this control point is Op Code 0x20 followed by the appropriate Response Value, including the value of the raw force or a raw torque in the Response Parameter (defined per Service).

Op Code Value	Definition	Parameter	Parameter Type	Description
0x0D	Mask Cycling Power Measurement Characteristic Content	Content Mask (defined per Service)		Initiate the procedure to set the content of Cycling Power Measurement Characteristic. The response to this control point is Op Code 0x20 followed by the appropriate Response Value.
0x0E	Request Sampling Rate			Request the sampling rate value set in the Sensor. The response to this control point is Op Code 0x20 followed by the appropriate Response Value, including the value of the sampling rate in the Response Parameter.
0x0F	Request Factory Calibration Date			Request the Factory calibration date set in the Sensor. The response to this control point is Op Code 0x20 followed by the appropriate Response Value, including the value of the Factory calibration date in the Response Parameter.
0x10	Start Enhanced Offset Compensation			Starts the offset compensation process of the Sensor. The response to this control point is Op Code 0x20 followed by the appropriate Response Value, including the value of the raw force or a raw torque in the Response Parameter and an option for a manufacturer specific value (defined per Service).
0x11–0x1F	Reserved for Future Use	N/A	N/A	N/A
0x20	Response Code	Request Op Code, Response Code Value, Response Parameter	N/A	See Section 3.48.2.2
0x21–0xFF	Reserved for Future Use	N/A	N/A	N/A

Table 3.82: Cycling Power Control Point Op Code and Parameter field

3.48.2.2 Response Code Values

The Response Code Values associated with the Cycling Power Control Point are defined in Table 3.83.

Response Code Value	Definition	Response Parameter	Description
0x00	Reserved For Future Use	N/A	N/A
0x01	Success	Defined per service	Normal response for successful operation.
0x02	Op Code not supported	N/A	Response if unsupported Op Code is received
0x03	Invalid Operand	N/A	Response if Parameter received does not meet the requirements of the service.
0x04	Operation Failed	Defined per Service	Response if the requested procedure failed.
0x05–0xFF	Reserved for Future Use		N/A

Table 3.83: Cycling Power Control Point Response Code Values

3.49 Cycling Power Feature

3.49.1 Description

The Cycling Power Feature characteristic is used to describe the supported features of the Cycling Power sensor.

The Cycling Power Feature characteristic is a fixed-length structure containing a single Cycling Power Feature field.

3.49.2 Definition

The structure of this characteristic is defined in Table 3.84.

Field	Data Type	Size (in octets)	Description
Cycling Power Feature	struct	4	See Section 3.49.2.1

Table 3.84: Cycling Power Feature characteristic

3.49.2.1 Cycling Power Feature field

The bits of this field are defined in Table 3.85.

Bit Number	Definition
0	Pedal Power Balance Supported 0 = False 1 = True
1	Accumulated Torque Supported 0 = False 1 = True
2	Wheel Revolution Data Supported 0 = False 1 = True
3	Crank Revolution Data Supported 0 = False 1 = True
4	Extreme Magnitudes Supported 0 = False 1 = True
5	Extreme Angles Supported 0 = False 1 = True
6	Top and Bottom Dead Spot Angles Supported 0 = False 1 = True
7	Accumulated Energy Supported 0 = False 1 = True
8	Offset Compensation Indicator Supported 0 = False 1 = True
9	Offset Compensation Supported 0 = False 1 = True
10	Cycling Power Measurement Characteristic Content Masking Supported: 0: False 1: True

Bit Number	Definition
11	Multiple Sensor Locations Supported 0 = False 1 = True
12	Crank Length Adjustment Supported 0 = False 1 = True
13	Chain Length Adjustment Supported 0 = False 1 = True
14	Chain Weight Adjustment Supported 0 = False 1 = True
15	Span Length Adjustment Supported 0 = False 1 = True
16	Sensor Measurement Context 0 = Force based 1 = Torque based
17	Instantaneous Measurement Direction Supported 0 = False 1 = True
18	Factory Calibration Date Supported 0 = False 1 = True
19	Enhanced Offset Compensation Procedure Supported 0 = False 1 = True

<table>
<tr><th>Bit Number</th><th>Definition</th></tr>
<tr><td>20–21</td><td>Distributed System Support
<table>
<tr><td>Bit21</td><td>Bit20</td><td>Definition</td></tr>
<tr><td>0</td><td>0</td><td>Unspecified (Legacy Sensor)</td></tr>
<tr><td>0</td><td>1</td><td>Not for use in a distributed system</td></tr>
<tr><td>1</td><td>0</td><td>Can be used in a distributed system</td></tr>
<tr><td>1</td><td>1</td><td>RFU</td></tr>
</table></td></tr>
<tr><td>22–31</td><td>Reserved for Future Use</td></tr>
</table>

Table 3.85: Cycling Power Feature field

3.50 Cycling Power Measurement

3.50.1 Description

The Cycling Power Measurement characteristic is a variable-length structure containing a Flags field, an Instantaneous Power field and, based on the contents of the Flags field, one or more additional fields as described in Section 3.50.2.

3.50.2 Definition

The structure of this characteristic is defined in Table 3.86.

Field		Data Type	Size (in octets)	Description
Flags		struct	2	See Section 3.50.2.1
Instantaneous Power		sint16	2	Unit: org.bluetooth.unit.power.watt
Pedal Power Balance Present if bit 0 of Flags field set to 1		uint8	1	Base Unit: org.bluetooth.unit.percentage Represented values: M = 1, d = 0, b = -1 Unit is 1/2 of a percent
Accumulated Torque Present if bit 2 of Flags field set to 1		uint16	2	Base Unit: org.bluetooth.unit.moment_of_force.newton_metre Represented values: M = 1, d = 0, b = -5 Unit is 1/32 Newton meter
Wheel Revolution Data Present if bit 4 of Flags field set to 1	Cumulative Wheel Revolutions	uint32	4	Unit: org.bluetooth.unit.unitless
	Last Wheel Event Time	uint16	2	Base Unit: org.bluetooth.unit.time.second Represented values: M = 1, d = 0, b = -11 Unit is 1/2048 second

Field		Data Type	Size (in octets)	Description
Crank Revolution Data Present if bit 5 of Flags field set to 1	Cumulative Crank Revolutions	uint16	2	Unit: org.bluetooth.unit.unitless
	Last Crank Event Time	uint16	2	Base Unit: org.bluetooth.unit.time.second Represented values: M = 1, d = 0, b = -10 Unit is 1/1024 second
Extreme Force Magnitudes Present if bit 6 of Flags field set to 1	Maximum Force Magnitude	sint16	2	Unit: org.bluetooth.unit.force.newton
	Minimum Force Magnitude	sint16	2	Unit: org.bluetooth.unit.force.newton
Extreme Torque Magnitudes Present if bit 7 of Flags field set to 1	Maximum Torque Magnitude	sint16	2	Base Unit: org.bluetooth.unit.moment_of_force.newton_metre Represented values: M = 1, d = 0, b = -5 Unit is 1/32 Newton meter
	Minimum Torque Magnitude	sint16	2	Base Unit: org.bluetooth.unit.moment_of_force.newton_metre Represented values: M = 1, d = 0, b = -5 Unit is 1/32 Newton meter
Extreme Angles Present if bit 8 of Flags field set to 1	Maximum Angle	uint12	3	See Section 3.50.2.2 Unit: org.bluetooth.unit.plane_angle.degree
	Minimum Angle	uint12		
Top Dead Spot Angle Present if bit 9 of Flags field set to 1		uint16	2	See Section 3.50.2.3 Unit: org.bluetooth.unit.plane_angle.degree
Bottom Dead Spot Angle Present if bit 10 of Flags field set to 1		uint16	2	See Section 3.50.2.3 Unit: org.bluetooth.unit.plane_angle.degree
Accumulated Energy Present if bit 11 of Flags field set to 1		uint16	2	Base Unit: org.bluetooth.unit.energy.joule Represented values: M = 1, d = 3, b = 0 Unit is kilojoule

Table 3.86: Cycling Power Measurement characteristic

3.50.2.1 Flags field

The values of this field are defined in Table 3.87.

Bit Number	Definition
0	Pedal Power Balance Present 0: False 1: True
1	Pedal Power Balance Reference 0: Unknown 1: Left
2	Accumulated Torque Present 0: False 1: True
3	Accumulated Torque Source 0: Wheel based 1: Crank based
4	Wheel Revolution Data Present 0: False 1: True
5	Crank Revolution Data Present 0: False 1: True
6	Extreme Force Magnitudes Present 0: False 1: True
7	Extreme Torque Magnitudes Present 0: False 1: True
8	Extreme Angles Present 0: False 1: True
9	Top Dead Spot Angle Present 0: False 1: True

Bit Number	Definition
10	Bottom Dead Spot Angle Present 0: False 1: True
11	Accumulated Energy Present 0: False 1: True
12	Offset Compensation Indicator 0: False 1: True
13–15	Reserved for Future Use

Table 3.87: Flags field

3.50.2.2 Extreme Angles field

When observed with the front wheel to the right of the pedals, a value of 0 degrees represents the angle when the crank is in the 12 o'clock position and a value of 90 degrees represents the angle, measured clockwise, when the crank points towards the front wheel in the 3 o'clock position. The left crank sensor (if fitted) detects 0 degrees when the crank it is attached to is in the 12 o'clock position, and the right sensor (if fitted) detects 0 degrees when the crank it is attached to is in the 12 o'clock position; thus, there is a constant 180-degree difference between the right crank and the left crank position signals.

When present, both subfields "Extreme Angles - Minimum Angle" and "Extreme Angles - Maximum Angle" are always present as a pair and are concatenated into a uint24 value (3 octets). As an example, if the Maximum Angle is 0xABC and the Minimum Angle is 0x123, the transmitted value is 0x123ABC.

3.50.2.3 Top and Bottom Dead Angles fields

When observed with the front wheel to the right of the pedals, a value of 0 degrees represents the angle when the crank is in the 12 o'clock position and a value of 90 degrees represents the angle, measured clockwise, when the crank points towards the front wheel in the 3 o'clock position. The left crank sensor (if fitted) detects 0 degrees when the crank it is attached to is in the 12 o'clock position, and the right sensor (if fitted) detects 0 degrees when the crank it is attached to is in the 12 o'clock position; thus, there is a constant 180-degree difference between the right crank and the left crank position signals.

3.51 Cycling Power Vector

3.51.1 Description

The Cycling Power Vector characteristic is a variable-length structure containing a Flags field, an Instantaneous Measurement Array field, and based on the contents of the Flags field, one or more additional fields as described in Section 3.51.2.

3.51.2 Definition

The structure of this characteristic is defined in Table 3.88.

Field		Data Type	Size (in octets)	Description
Flags		16-bit	2	See Section 3.51.2.1
Crank Revolution Data Present if bit 0 of Flags field set to 1	Cumulative Crank Revolutions	uint16	2	Unit: org.bluetooth.unit.unitless
	Last Crank Event Time	uint16	2	Base Unit: org.bluetooth.unit.time.second Represented values: M = 1, d = 0, b = -10 Unit is 1/1024 second
First Crank Measurement Angle Present if bit 1 of Flags field set to 1		uint16	2	See Section 3.51.2.3 Unit: org.bluetooth.unit.plane_angle.degree
Instantaneous Force Magnitude Array Present if bit 2 of Flags field set to 1		sint16 Array	0–18	See Section 3.51.2.2 Unit: org.bluetooth.unit.force.newton
Instantaneous Torque Magnitude Array Present if bit 3 of Flags field set to 1		sint16 Array	0–18	See Section 3.51.2.2 Base Unit: org.bluetooth.unit.moment_of_force.newton_metre Represented values: M = 1, d = 0, b = -5 Unit is 1/32 Newton meter

Table 3.88: Cycling Power Vector characteristic

3.51.2.1 Flags field

The values of this field are defined in Table 3.89.

Bit Number	Definition
0	Crank Revolution Data Present 0: False 1: True
1	First Crank Measurement Angle Present 0: False 1: True
2	Instantaneous Force Magnitude Array Present 0: False 1: True (Note 1)

<table>
<tr><th>Bit Number</th><th>Definition</th></tr>
<tr><td>3</td><td>Instantaneous Torque Magnitude Array Present
0: False
1: True (Note 1)</td></tr>
<tr><td>4–5</td><td>Instantaneous Measurement Direction
<table>
<tr><td>Bit5</td><td>Bit4</td><td>Definition</td></tr>
<tr><td>0</td><td>0</td><td>Unknown</td></tr>
<tr><td>0</td><td>1</td><td>Tangential Component</td></tr>
<tr><td>1</td><td>0</td><td>Radial Component</td></tr>
<tr><td>1</td><td>1</td><td>Lateral Component</td></tr>
</table></td></tr>
<tr><td>6–7</td><td>Reserved for Future Use</td></tr>
</table>

Table 3.89: Flags field

3.51.2.2 Instantaneous Force Magnitude Array and Instantaneous Torque Magnitude Array field

The Instantaneous Force Magnitude Array and Instantaneous Torque Magnitude Array fields are variable-length fields and may represent one or more Instantaneous Magnitude values. Each of the Instantaneous Magnitude values is represented using 16 bits signed integer. The Instantaneous Magnitude values present in the Instantaneous Force Magnitude Array are expressed in Newton with a resolution of 1 Newton and the Instantaneous Magnitude values present in the Instantaneous Torque Magnitude Array are expressed in Newton meter with a resolution of 1/32 Newton meter.

Because several Instantaneous Magnitude values may be measured between transmissions of the Cycling Power Vector characteristic, multiple Instantaneous Magnitude values may be present in the characteristic. The number of Instantaneous Magnitude values present is determined by the overall length of the characteristic and whether or not the characteristic contains the Crank Revolutions Data and the First Measurement Crank Angle fields.

Where there are multiple Instantaneous Magnitude values transmitted in the Cycling Power Vector characteristic, the Instantaneous Measurement Array field uses the following format:

Instantaneous Magnitude value 0 (LSO...MSO), Instantaneous Magnitude value 1 (LSO...MSO), Instantaneous Magnitude value 2 (LSO...MSO), … , Instantaneous Magnitude value n (LSO...MSO). Where the Instantaneous Magnitude value 0 is older than the Instantaneous Magnitude value 1.

Instantaneous Magnitude value 0 is transmitted first followed by the newer measurements.

3.51.2.3 First Crank Measurement Angle field

When observed with the front wheel to the right of the pedals, a value of 0 degrees represents the angle when the crank is in the 12 o'clock position and a value of 90 degrees represents the angle, measured clockwise, when the crank points towards the front wheel in a 3 o'clock position. The left crank sensor (if

fitted) detects the 0° when the crank it is attached to is in the 12 o'clock position and the right sensor (if fitted) detects the 0° when the crank it is attached to is in its 12 o'clock position; thus, there is a constant 180° difference between the right crank and the left crank position signals.

3.52 Database Change Increment

3.52.1 Description

The Database Change Increment characteristic exposes a value that is used by a Client to determine whether or not the UDS Characteristic(s) need to be synchronized between the Server and the Client.

The Database Change Increment characteristic is a fixed-length structure containing a single field.

3.52.2 Definition

The structure of this characteristic is defined below:

Field	Data Type	Size (in octets)	Description
Database Change Increment	uint32	4	Unit: org.bluetooth.unit.unitless The Database Change Increment is a unitless integer value.

Table 3.90: Structure of the Database Change Increment characteristic

3.53 Date Of Birth

3.53.1 Description

The Date Of Birth characteristic exposes the date of birth of the current user (i.e. the user that has given consent to access the UDS Characteristics) as defined by the Gregorian calendar.

The Date Of Birth characteristic is a member of the set of “UDS Characteristics” listed in the User Data Service Characteristics Table in the Bluetooth SIG Assigned Numbers (see the User Data Service [5]).

The Date of Birth characteristic is a fixed-length structure containing three fields.

3.53.2 Definition

The structure of this characteristic is defined below:

Field	Data Type	Size (in octets)	Description
Year	uint16	2	Unit; org.bluetooth.unit.time.year The Year is an integer value. Minimum value: 1582 Maximum value: 9999 In addition to the above range, a special value is defined: 0: Year is not known
Month	uint8	1	See Section 3.53.2.1.
Day	uint8	1	Unit: org.bluetooth.unit.time.day The Day is an integer value. Minimum value: 1 Maximum value: 31 In addition to the above range, a special value is defined: 0: Day of Month is not known

Table 3.91: Structure of the Date Of Birth characteristic

Note: The fields in the above table are in the order of LSO to MSO, reading from top to bottom, where LSO = Least Significant Octet and MSO = Most Significant Octet.

3.53.2.1 Month field

The enumeration of the Month field is defined as follows:

Enumeration	Definition
0	Month is not known
1	January
2	February
3	March
4	April
5	May
6	June
7	July
8	August
9	September

Enumeration	Definition
10	October
11	November
12	December
13–255	Reserved for Future Use

Table 3.92: Month field

3.54 Date Of Threshold Assessment

3.54.1 Description

The Date Of Threshold Assessment characteristic exposes the date of threshold assessment of the current user (i.e. the user that has given consent to access the UDS Characteristics) as defined by the Gregorian calendar.

The Date Of Threshold Assessment characteristic is a member of the set of “UDS Characteristics” listed in the User Data Service Characteristics Table in the Bluetooth SIG Assigned Numbers (see the User Data Service [5]).

The Date Of Threshold Assessment characteristic is a fixed-length structure containing three fields.

3.54.2 Definition

The structure of this characteristic is defined below:

Field	Data Type	Size (in octets)	Description
Year	uint16	2	Unit; org.bluetooth.unit.time.year The Year is an integer value. Minimum value: 1582 Maximum value: 9999 In addition to the above range, a special value is defined: 0: Year is not known
Month	uint8	1	See section 3.54.2.1.
Day	uint8	1	Unit: org.bluetooth.unit.time.day The Day is an integer value. Minimum value: 1 Maximum value: 31 In addition to the above range, a special value is defined: 0: Day of Month is not known

Table 3.93: Structure of the Date Of Threshold Assessment characteristic

Note: The fields in the above table are in the order of LSO to MSO, reading from top to bottom, where LSO = Least Significant Octet and MSO = Most Significant Octet.

3.54.2.1 Month field

The enumeration of the Month field is defined as follows:

Enumeration	Definition
0	Month is not known
1	January
2	February
3	March
4	April
5	May
6	June
7	July
8	August
9	September
10	October
11	November
12	December
13–255	Reserved for Future Use

Table 3.94: Month field

3.55 Date Time

3.55.1 Description

The Date Time characteristic is used to represent time. It contains fields for year, month, day, hours, minutes and seconds. Calendar days in Date Time shall be represented using Gregorian calendar. Hours in Date Time shall be represented in the 24h system.

3.55.2 Definition

The structure of this characteristic is defined below:

Field	Data Type	Size (in octets)	Description
Year	uint16	2	Year as defined by the Gregorian calendar. Valid range 1582 to 9999. A value of 0 means that the year is not known. All other values are reserved for future use (RFU).
Month	uint8	1	Month of the year as defined by the Gregorian calendar. Valid range 1 (January) to 12 (December). A value of 0 means that the month is not known. All other values are reserved for future use (RFU).
Day	uint8	1	Day of the month as defined by the Gregorian calendar. Valid range 1 to 31. A value of 0 means that the day of month is not known. All other values are reserved for future use (RFU).
Hours	uint8	1	Number of hours past midnight. Valid range 0 to 23. All other values are reserved for future use (RFU).
Minutes	uint8	1	Number of minutes since the start of the hour. Valid range 0 to 59. All other values are reserved for future use (RFU).
Seconds	uint8	1	Number of seconds since the start of the minute. Valid range 0 to 59. All other values are reserved for future use (RFU).

Table 3.95: Structure of the Date Time characteristic

3.56 Day Date Time

3.56.1 Description

The Day Date Time characteristic is used to represent time. It contains year, month, day, hours, minutes, seconds, and the day of the week.

3.56.2 Definition

The structure of this characteristic is defined below:

Field	Data Type	Size (in octets)	Description
Date Time	struct	7	Refer to the Date Time characteristic in Section 3.55
Day of Week	struct	1	Refer to the Day of Week characteristic in Section 3.57

Table 3.96: Structure of the Day Date Time characteristic

3.57 Day of Week

3.57.1 Description

The Day of Week characteristic is used to represent the days of a seven-day week as specified in ISO 8601. The week starts with Monday (1) and ends with Sunday (7).

3.57.2 Definition

The structure of this characteristic is defined below:

Field	Data Type	Size (in octets)	Description
Day of Week	uint8	1	See Section 3.57.2.1

Table 3.97: Structure of the Day of Week characteristic

3.57.2.1 Day of Week field

The following values are defined for the Day of Week field:

Description	Value
Monday	1
Tuesday	2
Wednesday	3
Thursday	4
Friday	5
Saturday	6
Sunday	7

Description	Value
Unknown	0
Reserved for Future Use	8–255

Table 3.98: Day of Week field

3.58 Date UTC

3.58.1 Description

Date as days elapsed since the Epoch (Jan 1, 1970) in the Coordinated Universal Time (UTC) time zone.

3.58.2 Definition

The structure of this characteristic is defined below:

Field	Data Type	Size (in octets)	Description
Date	uint24	3	Unit is a day with a resolution of 1. Minimum: 1 Maximum: 16777214 Represented values: M = 1, d = 0, b = 0 Unit: org.bluetooth.unit.time.day A value of 0x000000 represents 'value is not known'.

Table 3.99: Structure of the Date UTC characteristic

3.59 Dew Point

3.59.1 Description

The Dew Point characteristic is used to represent the dew point in degrees Celsius.

The Dew Point characteristic is a fixed-length structure containing a single Dew Point field.

3.59.2 Definition

The structure of this characteristic is defined below:

Field	Data Type	Size (in octets)	Description
Dew Point	sint8	1	Base Unit: org.bluetooth.unit.thermodynamic_temperature.degree_celsius Represented values: M = 1, d = 0, b = 0 Unit is in degrees Celsius with a resolution of 1 degree Celsius.

Table 3.100: Structure of the Dew Point characteristic

3.60 DST Offset

3.60.1 Description

The DST Offset characteristic is used to represent daylight saving time information associated with time.

3.60.2 Definition

The structure of this characteristic is defined below:

Field	Data Type	Size (in octets)	Description
DST Offset	uint8	1	See Section 3.60.2.1

Table 3.101: Structure of the DST Offset characteristic

3.60.2.1 DST Offset field

The following values are defined for the DST Offset field:

Description	Value
Standard Time	0
Half an hour Daylight Time (+ 0.5h)	2
Daylight Time (+ 1h)	4
Double Daylight Time (+ 2h)	8
DST offset unknown	255
Reserved for Future Use	1, 3, 5–7 and 9–254

Table 3.102: DST Offset field

3.61 Electric Current

3.61.1 Description

This characteristic represents an electric current.

3.61.2 Definition

The structure of this characteristic is defined below:

Field	Data Type	Size (in octets)	Description
Current	uint16	2	Unit is ampere with a resolution of 0.01. Minimum: 0 Maximum: 655.34 Represented values: M = 1, d = -2, b = 0 Unit: org.bluetooth.unit.electric_current.ampere A value of 0xFFFF represents 'value is not known'.

Table 3.103: Structure of the Electric Current characteristic

3.62 Electric Current Range

3.62.1 Description

This characteristic aggregates two instances of the Electric Current characteristic to represent a range of Electric Current values.

3.62.2 Definition

The structure of this characteristic is defined below:

Field	Data Type	Size (in octets)	Description
Minimum Electric Current Value	struct	2	Refer to the Electric Current characteristic in Section 3.61
Maximum Electric Current Value	struct	2	Refer to the Electric Current characteristic in Section 3.61

Table 3.104: Structure of the Electric Current Range characteristic

3.63 Electric Current Specification

3.63.1 Description

This characteristic aggregates three instances of the Electric Current characteristic to represent a specification of electric current values.

3.63.2 Definition

The structure of this characteristic is defined below:

Field	Data Type	Size (in octets)	Description
Minimum Electric Current Value	struct	2	Refer to the Electric Current characteristic in Section 3.61
Typical Electric Current Value	struct	2	Refer to the Electric Current characteristic in Section 3.61
Maximum Electric Current Value	struct	2	Refer to the Electric Current characteristic in Section 3.61

Table 3.105: Structure of the Electric Current Specification characteristic

3.64 Electric Current Statistics

3.64.1 Description

This characteristic aggregates four instances of the Electric Current characteristic with a Sensing Duration to represent a set of statistical electric current values.

3.64.2 Definition

The structure of this characteristic is defined below:

Field	Data Type	Size (in octets)	Description
Average Electric Current Value	struct	2	Refer to the Electric Current characteristic in Section 3.61
Standard Deviation Electric Current Value	struct	2	Refer to the Electric Current characteristic in Section 3.61
Minimum Electric Current Value	struct	2	Refer to the Electric Current characteristic in Section 3.61
Maximum Electric Current Value	struct	2	Refer to the Electric Current characteristic in Section 3.61
Sensing Duration	struct	1	Refer to the Time Exponential 8 characteristic in Section 3.170

Table 3.106: Structure of the Electric Current Statistics characteristic

3.65 Elevation

3.65.1 Description

The Elevation characteristic is used to represent the elevation.

The Elevation characteristic is a fixed-length structure containing a single Elevation field.

3.65.2 Definition

The structure of this characteristic is defined below:

Field	Data Type	Size (in octets)	Description
Elevation	sint24	3	Base Unit: org.bluetooth.unit.length.meter Represented values: M = 1, d = -2, b = 0 Unit is in meters with a resolution of 0.01 m.

Table 3.107: Structure of the Elevation characteristic

3.66 Email Address

3.66.1 Description

The Email Address characteristic exposes the email address of the current user (i.e. the user that has given consent to access the UDS Characteristics).

The Email Address characteristic is a member of the set of “UDS Characteristics” listed in the User Data Service Characteristics Table in the Bluetooth SIG Assigned Numbers (see the User Data Service [5]).

The Email Address characteristic is a variable-length structure containing a single field.

3.66.2 Definition

The structure of this characteristic is defined below:

Field	Data Type	Size (in octets)	Description
Email Address	utf8s	variable	UTF-8 string

Table 3.108: Structure of the Email Address characteristic

3.67 Energy

3.67.1 Description

The Energy characteristic is used to represent a measure of energy in units of kilowatt hours.

3.67.2 Definition

The structure of this characteristic is defined below:

Field	Data Type	Size (in octets)	Description
Energy	uint24	3	Unit is Kilowatt-hour with a resolution of 1. Minimum: 0 Maximum: 16777214 Represented values: M = 1, d = 0, b = 0 Unit: org.bluetooth.unit.energy.kilowatt_hour A value of 0xFFFFFF represents ‘value is not known’.

Table 3.109: Structure of the Energy characteristic

3.68 Energy32

3.68.1 Description

The Energy32 characteristic is used to represent a measure of energy in units of kilowatt-hours, with a precision of 1 Watt-hour.

3.68.2 Definition

The structure of this characteristic is defined below:

Field	Data Type	Size (in octets)	Description
Energy32	uint32	4	Unit is Kilowatt-hour with a resolution of 1 Watt-hour. Minimum: 0 Maximum:0xFFFFFFFF Represented values: M = 1, d = -3, b = 0 Unit: org.bluetooth.unit.energy.kilowatt_hour Allowed represented range is 0.000 to 4294967.293. A value of 0xFFFFFFFE represents ’value is not valid’. A value of 0xFFFFFFFF represents ‘value is not known’.

Table 3.110: Structure of the Energy32 characteristic

3.69 Energy In A Period Of Day

3.69.1 Description

This characteristic aggregates the Energy characteristic, and two instances of the Time Decihour 8 characteristic, to represent energy use in a period of day.

3.69.2 Definition

The structure of this characteristic is defined below:

Field	Data Type	Size (in octets)	Description
Energy Value	struct	3	Refer to the Energy characteristic in Section 3.67
Start Time	struct	1	Refer to the Time Decihour 8 characteristic in Section 3.169
End Time	struct	1	Refer to the Time Decihour 8 characteristic in Section 3.169

Table 3.111: Structure of the Energy In A Period Of Day characteristic

3.70 Event Statistics

3.70.1 Description

This characteristic aggregates the Count 16 characteristic, two instances of the Time Decihour 8 characteristic and an instance of the Sensing Duration characteristic, to represent statistical values of events.

3.70.2 Definition

The structure of this characteristic is defined below:

Field	Data Type	Size (in octets)	Description
Number of Events	struct	2	Refer to the Count 16 characteristic in Section 3.41
Average Event Duration	struct	2	Refer to the Time Second 16 characteristic in Section 3.173
Time Elapsed Since Last Event	struct	1	Refer to the Time Exponential 8 characteristic in Section 3.170
Sensing Duration	struct	1	Refer to the Time Exponential 8 characteristic in Section 3.170

Table 3.112: Structure of the Event Statistics characteristic

3.71 Exact Time 256

3.71.1 Description

This characteristic aggregates the Day Date Time characteristic and one new field for fraction of seconds.

3.71.2 Definition

The structure of this characteristic is defined below:

Field	Data Type	Size (in octets)	Description
Day Date Time	struct	8	Refer to the Day Date Time characteristic in Section 3.56.
Fractions256	uint8	1	The number of 1/256 fractions of a second. Valid range 0–255.

Table 3.113: Structure of the Exact Time 256 characteristic

3.72 Fat Burn Heart Rate Lower Limit

3.72.1 Description

The Fat Burn Heart Rate Lower Limit characteristic exposes the lower limit of the heart rate, where the user maximizes the fat burn while exercising, for the current user (i.e. the user that has given consent to access the UDS Characteristics).

The Fat Burn Heart Rate Lower Limit characteristic is a member of the set of “UDS Characteristics” listed in the User Data Service Characteristics Table in the Bluetooth SIG Assigned Numbers (see the User Data Service [5]).

The Fat Burn Heart Rate Lower Limit characteristic is a fixed-length structure containing a single field.

3.72.2 Definition

The structure of this characteristic is defined below:

Field	Data Type	Size (in octets)	Description
Fat Burn Heart Rate Lower Limit	uint8	1	Unit: org.bluetooth.unit.period.beats_per_minute

Table 3.114: Structure of the Fat Burn Heart Rate Lower Limit characteristic

3.73 Fat Burn Heart Rate Upper Limit

3.73.1 Description

The Fat Burn Heart Rate Upper Limit characteristic exposes the upper limit of the heart rate, where the user maximizes the fat burn while exercising, for the current user (i.e. the user that has given consent to access the UDS Characteristics).

The Fat Burn Heart Rate Upper Limit characteristic is a member of the set of “UDS Characteristics” listed in the User Data Service Characteristics Table in the Bluetooth SIG Assigned Numbers (see the User Data Service [5]).

The Fat Burn Heart Rate Upper Limit characteristic is a fixed-length structure containing a single field.

3.73.2 Definition

The structure of this characteristic is defined below:

Field	Data Type	Size (in octets)	Description
Fat Burn Heart Rate Upper Limit	uint8	1	Unit: org.bluetooth.unit.period.beats_per_minute

Table 3.115: Structure of the Fat Burn Heart Rate Upper Limit characteristic

3.74 Firmware Revision String

3.74.1 Description

The Firmware Revision String characteristic is a UTF-8 string representing the revision of the firmware within the device.

3.74.2 Definition

The structure of this characteristic is defined in Table 3.116.

Field	Data Type	Size (in octets)	Description
Firmware Revision	utf8s	Variable	

Table 3.116: Firmware Revision String characteristic

3.75 First Name

3.75.1 Description

The First Name characteristic exposes the first name of the current user (i.e. the user that has given consent to access the UDS Characteristics).

The First Name characteristic is a member of the set of “UDS Characteristics” listed in the User Data Service Characteristics Table in the Bluetooth SIG Assigned Numbers (see the User Data Service [5]).

The First Name characteristic is a variable-length structure containing a single field.

3.75.2 Definition

The structure of this characteristic is defined below:

Field	Data Type	Size (in octets)	Description
First Name	utf8s	variable	UTF-8 string

Table 3.117: Structure of the First Name characteristic

3.76 Five Zone Heart Rate Limits

3.76.1 Description

The Five Zone Heart Rate Limits characteristic exposes the limits between the heart rate zones for the five-zone heart rate definition (Maximum, Hard, Moderate, Light, and Very Light) of the current user (i.e. the user that has given consent to access the UDS Characteristics).

The Five Zone Heart Rate Limits characteristic is a member of the set of “UDS Characteristics” listed in the User Data Service Characteristics Table in the Bluetooth SIG Assigned Numbers (see the User Data Service [5]).

The Five Zone Heart Rate Limits characteristic is a fixed-length structure containing four fields.

3.76.2 Definition

The structure of this characteristic is defined below:

Field	Data Type	Size (in octets)	Description
Five Zone Heart Rate Limits - Very light / Light Limit	uint8	1	Unit: org.bluetooth.unit.period.beats_per_minute
Five Zone Heart Rate Limits - Light / Moderate Limit	uint8	1	Unit: org.bluetooth.unit.period.beats_per_minute
Five Zone Heart Rate Limits - Moderate / Hard Limit	uint8	1	Unit: org.bluetooth.unit.period.beats_per_minute
Five Zone Heart Rate Limits - Hard / Maximum Limit	uint8	1	Unit: org.bluetooth.unit.period.beats_per_minute

Table 3.118: Structure of the Five Zone Heart Rate Limits characteristic

Note: The fields in the above table, reading from top to bottom, are in the order of LSO to MSO, where LSO = Least Significant Octet and MSO = Most Significant Octet.

3.77 Fixed String 16

3.77.1 Description

The Fixed String 16 characteristic represents a 16-octet UTF-8 string.

3.77.2 Definition

The structure of this characteristic is defined below:

Field	Data Type	Size (in octets)	Description
Fixed String	utf8s	16	UTF-8 string

Table 3.119: Structure of the Fixed String 16 characteristic

3.78 Fixed String 24

3.78.1 Description

The Fixed String 24 characteristic represents a 24-octet UTF-8 string.

3.78.2 Definition

The structure of this characteristic is defined below:

Field	Data Type	Size (in octets)	Description
Fixed String	utf8s	24	UTF-8 string

Table 3.120: Structure of the Fixed String 24 characteristic

3.79 Fixed String 36

3.79.1 Description

The Fixed String 36 characteristic represents a 36-octet UTF-8 string.

3.79.2 Definition

The structure of this characteristic is defined below:

Field	Data Type	Size (in octets)	Description
Fixed String	utf8s	36	UTF-8 string

Table 3.121: Structure of the Fixed String 36 characteristic

3.80 Fixed String 8

3.80.1 Description

The Fixed String 8 characteristic represents an 8-octet UTF-8 string.

3.80.2 Definition

The structure of this characteristic is defined below:

Field	Data Type	Size (in octets)	Description
Fixed String	utf8s	8	UTF-8 string

Table 3.122: Structure of the Fixed String 8 characteristic

3.81 Gender

3.81.1 Description

The Gender characteristic exposes the gender of the current user (i.e. the user that has given consent to access the UDS Characteristics).

The Gender characteristic is a member of the set of “UDS Characteristics” listed in the User Data Service Characteristics Table in the Bluetooth SIG Assigned Numbers (see the User Data Service [5]).

The Gender characteristic is a fixed-length structure containing a single field.

3.81.2 Definition

The structure of this characteristic is defined below:

Field	Data Type	Size (in octets)	Description
Gender	uint8	1	See Section 3.81.2.1

Table 3.123: Structure of the Gender characteristic

3.81.2.1 Gender field

The enumeration of the Gender field is defined as follows:

Enumeration	Definition
0	Male
1	Female
2	Unspecified
3–255	Reserved for Future Use

Table 3.124: Gender field

3.82 Generic Level

3.82.1 Description

The Generic Level characteristic represents a general level value of a setting of a device.

3.82.2 Definition

The structure of this characteristic is defined below:

Field	Data Type	Size (in octets)	Description
Generic Level	uint16	2	Unit is unitless with a resolution of 1. Minimum: 0 Maximum: 65535 Represented values: M = 1, d = 0, b = 0

Table 3.125: Structure of the Generic Level characteristic

3.83 Global Trade Item Number

3.83.1 Description

The Global Trade Item Number characteristic represents an identifier as issued by GS1 [6], which may consist up to 14 digits, and is here represented as a 48-bit unsigned integer.

3.83.2 Definition

The structure of this characteristic is defined below:

Field	Data Type	Size (in octets)	Description
Global Trade Item Number	uint48	6	

Table 3.126: Structure of the Global Trade Item Number characteristic

3.84 Glucose Feature

3.84.1 Description

The Glucose Feature characteristic contains information about the supported features related to glucose measurement capabilities.

3.84.2 Definition

The structure of a Glucose Feature is defined below:

The structure of this characteristic is defined in the following table.

Field	Data Type	Size (in octets)	Description
Glucose Feature	struct	2	See Section 3.84.2.1

Table 3.127: Glucose Feature characteristic

3.84.2.1 Glucose Feature field

The bits of the Glucose Feature field are defined below.

Bit	Definition
0	Low Battery Detection During Measurement support bit: 0 = Low Battery Detection During Measurement feature not supported 1 = Low Battery Detection During Measurement feature supported
1	Sensor Malfunction Detection support bit: 0 = Sensor Malfunction Detection feature not supported 1 = Sensor Malfunction Detection feature supported
2	Sensor Sample Size support bit: 0 = Sensor Sample Size feature not supported 1 = Sensor Sample Size feature supported
3	Sensor Strip Insertion Error Detection support bit: 0 = Sensor Strip Insertion Error Detection feature not supported

Bit	Definition
	1 = Sensor Strip Insertion Error Detection feature supported
4	Sensor Strip Type Error Detection support bit: 0 = Sensor Strip Type Error Detection not supported 1 = Sensor Strip Type Error Detection supported
5	Sensor Result High-Low Detection support bit: 0 = Sensor Result High-Low Detection not supported 1 = Sensor Result High-Low Detection supported
6	Sensor Temperature High-Low Detection support bit: 0 = Sensor Temperature High-Low Detection not supported 1 = Sensor Temperature High-Low Detection supported
7	Sensor Read Interrupt Detection support bit: 0 = Sensor Read Interrupt Detection not supported 1 = Sensor Read Interrupt Detection supported
8	General Device Fault support bit: 0 = General Device Fault not supported 1 = General Device Fault supported
9	Time Fault support bit: 0 = Time Fault not supported 1 = Time Fault supported
10	Multiple Bond support bit: 0 = Multiple Bonds not supported 1 = Multiple Bonds supported
11–15	Reserved for Future Use

Table 3.128: Glucose Feature field

3.85 Glucose Measurement

3.85.1 Description

The Glucose Measurement characteristic is a variable-length structure used to transmit a glucose measurement record. The characteristic includes a Flags field, a Sequence Number field, a Base Time field, a Time Offset field (optional), a Glucose Concentration field (optional), a Type-Sample Location field (optional), and a Sensor Status Annunciation field (optional).

The presence of the optional fields (Time Offset, Glucose Concentration, Type-Sample Location, and Sensor Status Annunciation) is dependent on the contents of the Flags field.

The minimum length of this structure is 10 octets and the maximum length if all Flags bits are set is 17 octets.

3.85.2 Definition

The structure of this characteristic is defined in Table 3.129:

Field	Data Type	Size (in octets)	Description
Flags	struct	1	See Section 3.85.2.1
Sequence Number	uint16	2	
Base Time	struct	7	Refer to Date Time characteristic in Section 3.55
Time Offset Present if Flags field bit 0 = 1	int16	0 or 2	See Section 3.85.2.2 unit = org.bluetooth.unit.time.minute
Glucose Concentration Present if Flags field bit 1 = 1	SFLOAT	0 or 2	If Bit 2 of Flags field set to 0, unit = org.bluetooth.unit.mass_density.kilogram_per_liter If Bit 2 of Flags field set to 1, unit = org.bluetooth.unit.mass_density.mole_per_litre
Type-Sample Location Present if Flags field bit 1 = 1	uint8	0 or 1	See Section 3.85.2.3
Sensor Status Annunciation Present if Flags field bit 3 = 1	struct	0 or 2	See Section 3.85.2.4

Table 3.129: Glucose Measurement characteristic

3.85.2.1 Flags field

The bits of the Flags field are defined in Table 3.130:

Bit	Definition
0	Time Offset Flag: 0 = Time Offset field not present 1 = Time Offset field present
1	Glucose Concentration and Type-Sample Location Flag: 0 = Glucose Concentration and Type-Sample Location fields not present 1 = Glucose Concentration and Type-Sample Location fields present
2	Glucose Units Flag: 0 = Glucose concentration in units of mg/dL 1 = Glucose concentration in units of mmol/L

Bit	Definition
3	Sensor Status Annunciation Flag: 0 = Sensor Status Annunciation field not present 1 = Sensor Status Annunciation field present
4	Context Information Flag: 0 = This record does not include context information 1 = This record includes context information
5–7	Reserved for Future Use

Table 3.130: Glucose Measurement characteristic Flags field

3.85.2.2 Time Offset field

The following values are defined for the Time Offset field, specifying the time difference to Base Time:

Description	Value
Time offset in minutes	0x0000–0xFFFF

Table 3.131: Glucose Measurement characteristic Time Offset field

3.85.2.3 Type-Sample Location field

The Type-Sample Location field is comprised of two nibbles, where the least significant nibble contains the Type value and the most significant nibble contains the Sample Location value.

The following values are defined for the Type nibble:

Description	Value
Reserved for Future Use	0x0
Capillary Whole blood	0x1
Capillary Plasma	0x2
Venous Whole blood	0x3
Venous Plasma	0x4
Arterial Whole blood	0x5
Arterial Plasma	0x6
Undetermined Whole blood	0x7
Undetermined Plasma	0x8
Interstitial Fluid (ISF)	0x9

Description	Value
Control Solution	0xA
Reserved for Future Use	0xB–0xF

Table 3.132: Glucose Measurement characteristic Type-Sample Location field: Type

The following values are defined for the Sample Location nibble:

Description	Value
Reserved for Future Use	0x0
Finger	0x1
Alternate Site Test (AST)	0x2
Earlobe	0x3
Control solution	0x4
Reserved for Future Use	0x5–0xE
Sample Location value not available	0xF

Table 3.133: Glucose Measurement characteristic Type-Sample Location field: Sample Location

3.85.2.4 Sensor Status Annunciation field

The bits of the Sensor Status Annunciation field are defined in Table 3.134.

Bit	Definition
0	Device battery low: 0 = The battery was not low at the time of measurement. 1 = The battery was low at the time of measurement.
1	Sensor malfunction: 0 = The sensor was not malfunctioning or faulting at the time of measurement. 1 = The sensor was malfunctioning or faulting at the time of measurement.
2	Sample size insufficient: 0 = There was enough blood or control solution on the strip during the measurement. 1 = There was not enough blood or control solution on the strip during the measurement.
3	Strip insertion error: 0 = The strip was inserted correctly. 1 = The strip was not inserted correctly.
4	Strip type incorrect: 0 = The strip was the right type for the device. 1 = The strip was not the right type for the device.

Bit	Definition
5	Sensor result too high: 0 = The reading or value was not higher than the device can process. 1 = The reading or value was higher than the device can process.
6	Sensor result too low: 0 = The reading or value was not lower than the device can process. 1 = The reading or value was lower than the device can process.
7	Sensor temperature too high: 0 = The ambient temperature was not too high for a valid test/result at the time of measurement. 1 = The ambient temperature was too high for a valid test/result at the time of measurement.
8	Sensor temperature too low: 0 = The ambient temperature was not too low for a valid test/result at the time of measurement. 1 = The ambient temperature was too low for a valid test/result at the time of measurement.
9	Sensor read interrupted: 0 = The reading was not interrupted and the strip was not pulled too soon during the measurement. 1 = The reading was interrupted or the strip was pulled too soon during the measurement.
10	General device fault: 0 = A general device fault has not occurred in the sensor device. 1 = A general device fault has occurred in the sensor device.
11	Time fault: 0 = A time fault has not occurred in the sensor device. 1 = A time fault has occurred in the sensor device and the time is inaccurate.
12–15	Reserved for Future Use

Table 3.134: Glucose Measurement characteristic Sensor Status Annunciation field

3.86 Glucose Measurement Context

3.86.1 Description

The Glucose Measurement Context characteristic is a variable-length structure used to transmit context information associated with a glucose measurement record. The characteristic includes a Flags field, a Sequence Number field, an Extended Flags field (optional), a Carbohydrate ID field (optional), a Carbohydrate field (optional), a Meal field (optional), a Tester-Health field (optional), an Exercise Duration field (optional), an Exercise Intensity field (optional), a Medication ID field (optional), a Medication field (optional), and an HbA1c field (optional).

The presence of the optional fields (Extended Flags, Carbohydrate ID, Carbohydrate, Meal, Tester-Health, Exercise Duration, Exercise Intensity, Medication ID, Medication, and HbA1c) is dependent on the contents of the Flags field.

The minimum length of this structure is three octets and the maximum length if all Flags bits are set is 17 octets.

3.86.2 Definition

The structure of this characteristic is defined in Table 3.135:

Field	Data Type	Size (in octets)	Description
Flags	struct	1	See Section 3.86.2.1
Sequence Number	uint16	2	
Extended Flags Present if Flags field bit 7 = 1	struct	0 or 1	See Section 3.86.2.2
Carbohydrate ID Present if Flags field bit 0 = 1	uint8	0 or 1	See Section 3.86.2.3
Carbohydrate Present if Flags field bit 0 = 1	SFLOAT	0 or 2	Unit: org.bluetooth.unit.mass.kilogram
Meal Present if Flags field bit 1 = 1	uint8	0 or 1	See Section 3.86.2.4
Tester-Health Present if Flags field bit 2 = 1	uint8	0 or 1	See Section 3.86.2.5
Exercise Duration Present if Flags field bit 3 = 1	uint16	0 or 2	See Section 3.86.2.6 Unit: org.bluetooth.unit.time.second
Exercise Intensity Present if Flags field bit 3 = 1	uint8	0 or 1	Unit: org.bluetooth.unit.percentage
Medication ID Present if Flags field bit 4 = 1	uint8	0 or 1	See Section 3.86.2.7

Field	Data Type	Size (in octets)	Description
Medication Present if Flags field bit 4 = 1	SFLOAT	0 or 2	If Bit 5 of Flags field set to 0, Unit: org.bluetooth.unit.mass.kilogram If Bit 5 of Flags field set to 1, Unit: org.bluetooth.unit.volume.litre
HbA1c Present if Flags field bit 6 = 1	SFLOAT	0 or 2	Unit: org.bluetooth.unit.percentage

Table 3.135: Glucose Measurement Context characteristic

3.86.2.1 Flags field

The bits of the Flags field are defined in Table 3.136:

Bit	Definition
0	Carbohydrates Flag: 0 = Carbohydrate ID and Carbohydrate fields not present 1 = Carbohydrate ID and Carbohydrate fields present
1	Meal Flag: 0 = Meal field not present 1 = Meal field present
2	Tester-Health Flag: 0 = Tester-Health field not present 1 = Tester-Health field present
3	Exercise Flag: 0 = Exercise Duration and Exercise Intensity fields not present 1 = Exercise Duration and Exercise Intensity fields present
4	Medication Flag: 0 = Medication ID and Medication fields not present 1 = Medication ID and Medication fields present
5	Medication Units Flag: 0 = Medication value in units of milligrams 1 = Medication value in units of milliliters

Bit	Definition
6	HbA1c Flag: 0 = HbA1c field not present 1 = HbA1c field present
7	Extended Flags: 0 = Extended Flags field not present 1 = Extended Flags field present

Table 3.136: Glucose Measurement Context characteristic Flags field

3.86.2.2 Extended Flags field

The bits of the Extended Flags field are defined in Table 3.137

Bit	Definition
0–7	Reserved for Future Use

Table 3.137: Glucose Measurement Context characteristic Extended Flags field

3.86.2.3 Carbohydrate ID field

The following values are defined for the Carbohydrate ID field:

Description	Value
Reserved for Future Use	0x00
Breakfast	0x01
Lunch	0x02
Dinner	0x03
Snack	0x04
Drink	0x05
Supper	0x06
Brunch	0x07
Reserved for Future Use	0x08–0xFF

Table 3.138: Glucose Measurement Context characteristic Carbohydrate ID field

3.86.2.4 Meal field

The following values are defined for the Meal field:

Description	Value
Reserved for Future Use	0x00
Preprandial (before meal)	0x01

Description	Value
Postprandial (after meal)	0x02
Fasting	0x03
Casual (snacks, drinks, etc.)	0x04
Bedtime	0x05
Reserved for Future Use	0x06–0xFF

Table 3.139: Glucose Measurement Context characteristic Meal field

3.86.2.5 Tester-Health field

The Tester-Health field is comprised of two nibbles, where the least significant nibble contains the Tester value and the most significant nibble contains the Health value.

The following values are defined for the Tester nibble Table 3.140:

Description	Value
Reserved for Future Use	0x0
Self	0x1
Health Care Professional	0x2
Lab test	0x3
Reserved for Future Use	0x4–0xE
Tester value not available	0xF

Table 3.140: Glucose Measurement Context characteristic Tester-Health field: Tester

The following values are defined for the Health nibble Table 3.141:

Description	Value
Reserved for Future Use	0x0
Minor health issues	0x1
Major health issues	0x2
During menses	0x3
Under stress	0x4
No health issues	0x5
Reserved for Future Use	0x6–0xE
Health value not available	0xF

Table 3.141: Glucose Measurement Context characteristic Tester-Health field: Health

3.86.2.6 Exercise Duration field

The following values are defined for the Exercise Duration field Table 3.142:

Description	Value
Exercise Duration in seconds	0x0000–0xFFFE
Overrun	0xFFFF

Table 3.142: Glucose Measurement Context characteristic Exercise Duration field

3.86.2.7 Medication ID field

The following values are defined for the Medication ID field Table 3.143:

Description	Value
Reserved for Future Use	0x00
Rapid acting insulin	0x01
Short acting insulin	0x02
Intermediate acting insulin	0x03
Long acting insulin	0x04
Pre-mixed insulin	0x05
Reserved for Future Use	0x06–0xFF

Table 3.143: Glucose Measurement Context characteristic Medication ID field

3.87 Gust Factor

3.87.1 Description

The Gust Factor characteristic is used to represent the gust factor.

The Gust Factor characteristic is a fixed-length structure containing a single Gust Factor field.

3.87.2 Definition

The structure of this characteristic is defined below:

Field	Data Type	Size (in octets)	Description
Gust Factor	uint8	1	Base Unit: org.bluetooth.unit.unitless Represented values: M = 1, d = -1, b = 0 The factor has a fixed-point representation, where the actual factor is (attribute value * 0.1).

Table 3.144: Structure of the Gust Factor characteristic

3.88 Hardware Revision String

3.88.1 Description

The value of this characteristic is a UTF-8 string representing the hardware revision for the hardware within the device.

3.88.2 Definition

The structure of this characteristic is defined in Table 3.145.

Field	Data Type	Size (in octets)	Description
Hardware Revision	utf8s	variable	

Table 3.145: Hardware Revision String characteristic

3.89 Heart Rate Control Point

3.89.1 Description

The Heart Rate Control Point characteristic is a 1 octet enumeration containing a set of control points.

3.89.2 Definition

The structure of this characteristic is defined in Table 3.146.

Field	Data Type	Size (in octets)	Description
Heart Rate Control Point	uint8	1	See Section 3.89.2.1

Table 3.146: Heart Rate Control Point characteristic

3.89.2.1 Heart Rate Control Point field

The values of this field are defined in Table 3.147.

Key	Value	Description
0	Reserved	Reserved for Future Use
1	Reset Energy Expended	Resets the value of the Energy Expended field in the Heart Rate Measurement characteristic to 0
2–255	Reserved for Future Use	Reserved for Future Use

Table 3.147: Heart Rate Control Point characteristic Heart Rate Control Point field

3.90 Heart Rate Max

3.90.1 Description

The Heart Rate Max characteristic exposes the maximum heart rate of the current user (i.e. the user that has given consent to access the UDS Characteristics).

The Heart Rate Max characteristic is a member of the set of “UDS Characteristics” listed in the User Data Service Characteristics Table in the Bluetooth SIG Assigned Numbers (see the User Data Service [5]).

The Heart Rate Max characteristic is a fixed-length structure containing a single field.

3.90.2 Definition

The structure of this characteristic is defined below:

Field	Data Type	Size (in octets)	Description
Heart Rate Max	uint8	1	Unit: org.bluetooth.unit.period.beats_per_minute

Table 3.148: Structure of the Heart Rate Max characteristic

3.91 Heart Rate Measurement

3.91.1 Description

The Heart Rate Measurement characteristic is a variable-length structure containing a Flags field, a Heart Rate Measurement Value field and, based on the contents of the Flags field, may contain additional fields such as Energy Expended or RR-Interval.

3.91.2 Definition

The structure of this characteristic is defined in Table 3.149.

Field	Data Type	Size (in octets)	Description
Flags	struct	1	See Section 3.91.2.1
Heart Rate Measurement Value	If bit 0 of Flags field set to 0: uint8	If bit 0 of Flags field set to 0: 1	Unit: org.bluetooth.unit.period.beats_per_minute
	If bit 0 of Flags field set to 1: uint16	If bit 0 of Flags field set to 1: 2	

Field	Data Type	Size (in octets)	Description
Energy Expended Present if bit 3 of Flags field set to 1	uint16	0 or 2	Unit: org.bluetooth.unit.energy.joule
RR-intervals Present if bit 4 of Flags field set to 1	uint16 Array	0 or n*2	See Section 3.91.2.2

Table 3.149: Heart Rate Measurement characteristic

3.91.2.1 Flags field

The bits of this field are defined in Table 3.150.

Bit Number	Definition
0	Heart Rate Value Format: 0 = Heart Rate Value Format is set to uint8 1 = Heart Rate Value Format is set to uint16
1	Sensor Contact detected 0 = False 1 = True
2	Sensor Contact Supported 0 = False 1 = True
3	Energy Expended present: 0 = False 1 = True
4	RR-Intervals present: 0 = False 1 = True
5–7	Reserved for Future Use

Table 3.150: Heart Rate Measurement characteristic Flags field

3.91.2.2 RR-Interval

The RR-Interval value represents the time between two R-Wave detection. Because several RR-Intervals may be measured between transmissions of the Heart Rate Measurement characteristic, multiple RR-Interval sub-fields may be present in the characteristic. The number of RR-Interval sub-fields present is determined by a combination of the overall length of the characteristic and whether or not the characteristic contains the Energy Expended field. Where there are multiple RR-Interval values transmitted in the Heart Rate Measurement characteristic, the field uses the format in Table 3.151.

RR-Interval Value 0 (LSO … MSO)	RR-Interval Value 1 (LSO … MSO)	RR-Interval Value 2 (LSO … MSO)	…	RR-Interval Value n (LSO … MSO)

Table 3.151: Heart Rate Measurement characteristic RR-Interval field

Where the RR-Interval Value 0 is older than the RR-Interval Value 1. RR-Interval Value 0 is transmitted first followed by the newer measurements.

3.92 Heat Index

3.92.1 Description

The Heat Index characteristic is used to represent the heat index.

The Heat Index characteristic is a fixed-length structure containing a single Heat Index field.

3.92.2 Definition

The structure of this characteristic is defined below:

Field	Data Type	Size (in octets)	Description
Heat Index	sint8	1	Unit: org.bluetooth.unit.thermodynamic_temperature.degree_celsius

Table 3.152: Structure of the Heat Index characteristic

3.93 Height

3.93.1 Description

The Height characteristic exposes the height of the current user (i.e. the user that has given consent to access the UDS Characteristics).

The Height characteristic is a member of the set of “UDS Characteristics” listed in the User Data Service Characteristics Table in the Bluetooth SIG Assigned Numbers (see the User Data Service [5]).

The Height characteristic is a fixed-length structure containing a single field.

3.93.2 Definition

The structure of this characteristic is defined below:

Field	Data Type	Size (in octets)	Description
Height	uint16	2	Base Unit: org.bluetooth.unit.length.meter Represented values: M = 1, d = -2, b = 0 Unit is 0.01 meter.

Table 3.153: Structure of the Height characteristic

3.94 Hip Circumference

3.94.1 Description

The Hip Circumference characteristic exposes the hip measurement of the current user (i.e. the user that has given consent to access the UDS Characteristics).

The Hip Circumference characteristic is a member of the set of “UDS Characteristics” listed in the User Data Service Characteristics Table in the Bluetooth SIG Assigned Numbers (see the User Data Service [5]). This characteristic value may be used with the Waist Circumference characteristic value to calculate the Waist-to-Hip Ratio (WHR).

The Hip Circumference characteristic is a fixed-length structure containing a single field.

3.94.2 Definition

The structure of this characteristic is defined below:

Field	Data Type	Size (in octets)	Description
Hip Circumference	uint16	2	Base Unit: org.bluetooth.unit.length.meter Represented values: M = 1, d = -2, b = 0 Unit is 0.01 meter.

Table 3.154: Structure of the Hip Circumference characteristic

3.95 Humidity

3.95.1 Description

The Humidity characteristic is used to represent the humidity.

The Humidity characteristic is a fixed-length structure containing a single Humidity field.

3.95.2 Definition

The structure of this characteristic is defined below:

Field	Data Type	Size (in octets)	Description
Humidity	uint16	2	Base Unit: org.bluetooth.unit.percentage Represented values: M = 1, d = -2, b = 0 Unit is in percent with a resolution of 0.01 percent. Allowed range is: 0.00 to 100.00 A value of 0xFFFF represents ‘value is not known’. All other values are prohibited.

Table 3.155: Structure of the Humidity characteristic

3.96 IEEE 11073-20601 Regulatory Certification Data List

3.96.1 Description

This characteristic represents regulatory and certification information for the product in a list defined in IEEE 11073-20601.

The content of this characteristic is determined by the authorizing organization that provides certifications.

3.96.2 Definition

The structure of this characteristic is defined in Table 3.156.

Field	Data Type	Size (in octets)	Description
IEEE 11073-20601 Regulatory Certification Data List	struct	variable	Refer to 11073-20601 [2] or Continua Design Guidelines [3] for more information on the format of this list

Table 3.156: IEEE 11073-20601 Regulatory Certification Data List characteristic

3.97 Illuminance

3.97.1 Description

The Illuminance characteristic is used to represent a measure of illuminance in units of lux.

3.97.2 Definition

The structure of this characteristic is defined below:

Field	Data Type	Size (in octets)	Description
Illuminance	uint24	3	Unit is lux with a resolution of 0.01. Minimum: 0 Maximum: 167772.14 Represented values: M = 1, d = -2, b = 0 Unit: org.bluetooth.unit.illuminance.lux A value of 0xFFFFFF represents 'value is not known'. All other values are Prohibited.

Table 3.157: Structure of the Illuminance characteristic

3.98 Intermediate Cuff Pressure

3.98.1 Description

The Intermediate Cuff Pressure characteristic is used to send intermediate Cuff Pressure values to a device for display purposes while a measurement is in progress.

The Intermediate Cuff Pressure characteristic is a variable-length structure with the same format as the Blood Pressure Measurement characteristic. However, due to a different context, the Blood Pressure Measurement Compound Value field becomes the Intermediate Cuff Pressure Compound Value field and the Systolic sub-field becomes the Current Cuff Pressure sub-field. The Diastolic and Mean Arterial Pressure fields are unused.

3.98.2 Definition

The structure of this characteristic is defined below:

Field	Data Type	Size (in octets)	Requirement
Flags	struct	1	Mandatory field. See Section 3.98.2.1.
Intermediate Cuff Pressure Compound Value - Current Cuff Pressure (mmHg) Present if Flags field bit 0 = 0	SFLOAT	0 or 2	Unit: org.bluetooth.unit.pressure.millimetre_of_mercury Note: Field exists if the key of bit 0 of the Flags field is set to 0.
Intermediate Cuff Pressure Compound Value - Current Cuff Pressure (kPa) Present if Flags field bit 0 = 1	SFLOAT	0 or 2	Base Unit: org.bluetooth.unit.pressure.pascal; Multiplier: 103 Note: Field exists if the key of bit 0 of the Flags field is set to 1.
Intermediate Cuff Pressure Compound Value - Diastolic (unused)	SFLOAT	2	This unused subfield shall be set to the special value NaN as defined in ISO/IEEE 11073-20601a.
Intermediate Cuff Pressure Compound Value - Mean Arterial Pressure (unused)	SFLOAT	2	This unused subfield shall be set to the special value NaN as defined in ISO/IEEE 11073-20601a.
Time Stamp Present if Flags field bit 1 = 1	struct	0 or 7	Refer to Date Time characteristic in Section 3.55
Pulse Rate Present if Flags field bit 2 = 1	SFLOAT	0 or 2	Unit: org.bluetooth.unit.period.beats_per_minute Note: Field exists if the key of bit 2 of the Flags field is set to 1.
User ID Present if Flags field bit 3 = 1	uint8	0 or 1	See Section 3.98.2.2.

Field	Data Type	Size (in octets)	Requirement
Measurement Status Present if Flags field bit 4 = 1	struct	0 or 2	See Section 3.98.2.3.

Table 3.158: Structure of the Intermediate Cuff Pressure characteristic

3.98.2.1 Flags field

These flags define which data fields are present in the Characteristic value.

The bits of this field are defined as:

Bit	Bit Name
0	Blood Pressure Units Flag 0 = Blood pressure for Systolic, Diastolic and MAP in units of mmHg 1 = Blood pressure for Systolic, Diastolic and MAP in units of kPa
1	Time Stamp Flag 0 = Time Stamp not present 1 = Time Stamp present
2	Pulse Rate Flag 0 = Pulse Rate not present 1 = Pulse Rate present
3	User ID Flag 0 = User ID not present 1 = User ID present
4	Measurement Status Flag 0 = Measurement Status not present 1 = Measurement Status present
5–7	Reserved for Future Use

Table 3.159: Flags field

3.98.2.2 User ID field

This field is an enumeration defined as:

Key	Value
0x00–0xFE	Defined by the service specification
0xFF	Unknown User

Table 3.160: User-ID field

3.98.2.3 Measurement Status field

The bits of this field are defined as:

Bit	Bit Name	Value
0	Body Movement Detection Flag	0 = No body movement 1 = Body movement detected during measurement
1	Cuff Fit Detection Flag	0 = Cuff fits properly 1 = Cuff too loose
2	Irregular Pulse Detection Flag	0 = No irregular pulse detected 1 = Irregular pulse detected
3 and 4	Pulse Rate Range Detection Flags	Enumeration: 0b00: Pulse rate is within the range 0b01: Pulse rate exceeds upper limit 0b10: Pulse rate is less than lower limit 0b11: Reserved for Future Use
5	Measurement Position Detection Flag	0 = Proper measurement position 1 = Improper measurement position
6–15	Reserved for Future Use	

Table 3.161: Measurement Status field

Note: Field exists if the key of bit 4 of the Flags field is set to 1.

3.99 Intermediate Temperature

3.99.1 Description

The Intermediate Temperature characteristic has the same format as the Temperature Measurement characteristic in Section 3.160 except that, due to a different context, the Measurement Value field is referred to as the Intermediate Temperature field.

3.99.2 Definition

The structure of this characteristic is defined below:

Field	Data Type	Size (in octets)	Requirement
Flags	struct	1	See Section 3.99.2.1.

Intermediate Temperature (Celsius) Present if Flags field bit 0 = 0	FLOAT	0 or 4	This field contains a measurement value. Unit: org.bluetooth.unit.thermodynamic_temperature.degree_celsius. Note: This field is only included if the flags bit 0 is 0.
Intermediate Temperature (Fahrenheit) Present if Flags field bit 0 = 1	FLOAT	0 or 4	This field contains a measurement value. Unit: org.bluetooth.unit.thermodynamic_temperature.degree_fahrenheit. Note: This field is only included if the flags bit 0 is 1.
Time Stamp Present if Flags field bit 1 = 1	struct	0 or 7	Refer to Date Time characteristic in Section 3.55.
Temperature Type Present if Flags field bit 2 = 1	uint8	0 or 1	The format of this field is the same as the format of the value of the Temperature Type org.bluetooth.characteristic.temperature_type. Refer to the Temperature Type characteristic in Section 3.164. Note: If the flags bit 2 is set to 1 this field is included. If it is 0, this field is not included.

Table 3.162: Structure of the Intermediate Temperature characteristic

3.99.2.1 Flags field

The bits of this field are defined as:

Bit Number	Definition
0	Temperature Units Flag 0 = Intermediate Temperature in units of Celsius 1 = Intermediate Temperature in units of Fahrenheit
1	Time Stamp Flag 0 = Time Stamp field not present 1 = Time Stamp field present
2	Temperature Type Flag 0 = Temperature Type field not present 1 = Temperature Type field present
3–7	Reserved for Future Use

Table 3.163: Flags field

3.100 Irradiance

3.100.1 Description

The Irradiance characteristic is used to represent the irradiance, the radiant flux received by a surface per unit area.

The Irradiance characteristic is a fixed-length structure containing a single Irradiance field.

3.100.2 Definition

The structure of this characteristic is defined below:

Field	Data Type	Size (in octets)	Description
Irradiance	uint16	2	Base Unit: org.bluetooth.unit.irradiance.watt_per_square_metre Represented values: M = 1, d = -1, b = 0 Unit is in watt per square meter with a resolution of 0.1 W/m^2.

Table 3.164: Structure of the Irradiance characteristic

3.101 Language

3.101.1 Description

The Language characteristic exposes the preferred language of the current user (i.e. the user that has given consent to access the UDS Characteristics).

The Language characteristic is a member of the set of “UDS Characteristics” listed in the User Data Service Characteristics Table in the Bluetooth SIG Assigned Numbers (see the User Data Service [5]).

The Language characteristic is a variable-length structure containing a single field.

The Language definition is based on ISO 639-1.

3.101.2 Definition

The structure of this characteristic is defined below:

Field	Data Type	Size (in octets)	Description
Language	utf8s	variable	UTF-8 string

Table 3.165: Structure of the Language characteristic

3.102 Last Name

3.102.1 Description

The Last Name characteristic exposes the last name of the current user (i.e. the user that has given consent to access the UDS Characteristics).

The Last Name characteristic is a member of the set of “UDS Characteristics” listed in the User Data Service Characteristics Table in the Bluetooth SIG Assigned Numbers (see the User Data Service [5]).

The Last Name characteristic is a variable-length structure containing a single field.

3.102.2 Definition

The structure of this characteristic is defined below:

Field	Data Type	Size (in octets)	Description
Last Name	utf8s	variable	UTF-8 string

Table 3.166: Structure of the Last Name characteristic

3.103 LN Control Point

3.103.1 Description

The LN Control Point characteristic is used to request a specific function to be executed on the receiving device.

3.103.2 Definition

The structure of this characteristic is defined in Table 3.167.

Field	Data Type	Size (in octets)	Description
Op Code	uint8	1	See Section 3.103.2.1
Parameter	struct	0–18	See Section 3.103.2.1

Table 3.167: LN Control Point characteristic

3.103.2.1 Op Code and Parameter field

The values of these fields are defined in Table 3.168.

Op Code Value	Definition	Parameter	Parameter Type	Description
0x00	Reserved for Future Use	N/A	N/A	N/A
0x01	Set Cumulative Value	Cumulative value as defined per service	Defined per service	Initiate the procedure to reset a cumulative value. The new value is sent as a parameter following op code The response to this control point is Op Code 0x20 followed by the appropriate Response Value.
0x02	Mask Location and Speed Characteristic Content	Content Mask as defined per service	Defined per service	Initiate the procedure to set the content of Location and Speed Characteristic The response to this control point is Op Code 0x20 followed by the appropriate Response Value.
0x03	Navigation Control	Defined per service	Defined per service	Update to the location of the sensor with the value sent as parameter to this op code.
0x04	Request Number of Routes	N/A	N/A	Initiate the procedure to request the number of routes stored into the Sensor. The response to this control point is Op Code 0x20 followed by the appropriate Response Value, including the number of routes in the Response Parameter.
0x05	Request Name of Route	Defined per service	Defined per service	Initiate the procedure to request the name of wanted route stored into the Sensor. The response to this control point is Op Code 0x20 followed by the appropriate Response Value, including the name of the route in the Response Parameter.

Op Code Value	Definition	Parameter	Parameter Type	Description
0x06	Select Route	Defined per service	Defined per service	Initiate the procedure to select certain route to be used for navigation performed by the Sensor. The response to this control point is Op Code 0x20 followed by the appropriate Response Value.
0x07	Set Fix Rate	Defined per service	Defined per service	Initiate the procedure to set the Sensor fix rate. The response to this control point is Op Code 0x20 followed by the appropriate Response Value.
0x08	Set Elevation	Defined per service	Defined per service	Initiate the procedure to set the elevation value of the sensor (usually this procedure needed if barometric air pressure is used for elevation calculation and elevation needs calibration). The response to this control point is Op Code 0x20 followed by the appropriate Response Value.
0x09–0x1F	Reserved for Future Use	N/A	N/A	N/A
0x20	Response Code	Request Op Code, Response Code Value	N/A	See Section 3.103.2.2
0x21–0xFF	Reserved for Future Use	N/A	N/A	N/A

Table 3.168: LN Control Point Op Code and Parameter field

3.103.2.2 Response Code Values

The Response Code Values associated with the LN Control Point are defined in Table 3.169.

Response Code Value	Definition	Response Parameter	Description
0x00	Reserved for Future Use	N/A	N/A
0x01	Success	Defined per service	Response for successful operation.

Response Code Value	Definition	Response Parameter	Description
0x02	Op Code not supported	N/A	Response if unsupported Op Code is received
0x03	Invalid Operand	N/A	Response if Parameter received does not meet the requirements of the service.
0x04	Operation Failed	N/A	Response if the requested procedure failed.
0x05–0xFF	Reserved for Future Use		N/A

Table 3.169: LN Control Point Response Code Values

3.104 LN Feature

3.104.1 Description

The LN Feature characteristic is used to report a list of features supported by the device.

The LN Feature characteristic is a fixed-length structure containing a single LN Feature field.

3.104.2 Definition

The structure of this characteristic is defined in Table 3.170.

Field	Data Type	Size (in octets)	Description
LN Feature	Struct	4	See Section 3.104.2.1

Table 3.170: LN Feature characteristic

3.104.2.1 LN Feature field

The bits of this field are defined in Table 3.171.

Bit Number	Definition
0	Instantaneous Speed Supported: 0: False 1: True
1	Total Distance Supported: 0: False 1: True
2	Location Supported: 0: False 1: True

Bit Number	Definition
3	Elevation Supported: 0: False 1: True
4	Heading Supported: 0: False 1: True
5	Rolling Time Supported: 0: False 1: True
6	UTC Time Supported: 0: False 1: True
7	Remaining Distance Supported: 0: False 1: True
8	Remaining Vertical Distance Supported: 0: False 1: True
9	Estimated Time of Arrival Supported: 0: False 1: True
10	Number of Beacons in Solution Supported 0: False 1: True
11	Number of Beacons in View Supported 0: False 1: True
12	Time to First Fix Supported 0: False 1: True
13	Estimated Horizontal Position Error Supported: 0: False 1: True
14	Estimated Vertical Position Error Supported: 0: False 1: True
15	Horizontal Dilution of Precision Supported: 0: False 1: True

Bit Number	Definition
16	Vertical Dilution of Precision Supported: 0: False 1: True
17	Location and Speed Characteristic Content Masking Supported: 0: False 1: True
18	Fix Rate Setting Supported: 0: False 1: True
19	Elevation Setting Supported: 0: False 1: True
20	Position Status Supported: 0: False 1: True
21–31	Reserved for Future Use

Table 3.171: LN Feature field

3.105 Local Time Information

3.105.1 Description

The Local Time Information characteristic is used to define the relation (offset) between local time and UTC. It contains time zone and Daylight Savings Time (DST) offset information.

3.105.2 Definition

The structure of this characteristic is defined below:

Field	Data Type	Size (in octets)	Description
Time Zone	struct	1	Refer to Time Zone characteristic in Section 3.179
DST Offset	struct	1	Refer to DST Offset characteristic in Section 3.60

Table 3.172: Structure of the Local Time Information characteristic

3.106 Location And Speed

3.106.1 Description

The Location And Speed characteristic is a variable-length structure containing a Flags field and, based on the contents of the Flags field, a combination of data fields listed in Table 3.173. Note that it is possible for this characteristic to exceed the default LE ATT_MTU size.

3.106.2 Definition

The structure of this characteristic is defined in Table 3.173.

Field	Data Type	Size (in octets)	Description
Flags	struct	2	See Section 3.106.2.1
Instantaneous Speed Present if bit 0 of Flags field set to 1	uint16	2	Base Unit: org.bluetooth.unit.velocity.metres_per_second Represented values: M = 1, d = -2, b = 0 Unit is 1/100 of a m/s
Total Distance Present if bit 1 of Flags field set to 1	uint24	3	Base Unit: org.bluetooth.unit.length.metre Represented values: M = 1, d = -1, b = 0 Unit is 1/10 m
Location - Latitude Present if bit 2 of Flags field set to 1	sint32	4	Base Unit: org.bluetooth.unit.plane_angle.degree Represented values: M = 1, d = -7, b = 0 Unit is $1*10^{-7}$ degrees
Location - Longitude Present if bit 2 of Flags field set to 1	sint32	4	Base Unit: org.bluetooth.unit.plane_angle.degree Represented values: M = 1, d = -7, b = 0 Unit is $1*10^{-7}$ degrees
Elevation Present if bit 3 of Flags field set to 1	sint24	3	Base Unit: org.bluetooth.unit.length.metre Represented values: M = 1, d = -2, b = 0 Unit is 1/100 m
Heading Present if bit 4 of Flags field set to 1	uint16	2	Base Unit: org.bluetooth.unit.plane_angle.degree Represented values: M = 1, d = -7, b = 0 Unit is $1*10^{-7}$ degrees
Rolling Time Present if bit 5 of Flags field set to 1	uint8	1	Unit: org.bluetooth.unit.time.second
UTC Time Present if bit 6 of Flags field set to 1	struct	7	Refer to Date Time characteristic in Section 3.55.

Table 3.173: Location And Speed characteristic

3.106.2.1 Flags field

The values of this field are defined in Table 3.174.

Bit Number	Definition
0	Instantaneous Speed Present: 0: False 1: True
1	Total Distance Present: 0: False 1: True
2	Location Present: 0: False 1: True
3	Elevation Present: 0: False 1: True
4	Heading Present: 0: False 1: True
5	Rolling Time Present: 0: False 1: True
6	UTC Time Present: 0: False 1: True
7–8	Position Status: 0: No Position 1: Position Ok 2: Estimated Position 3: Last Known Position
9	Speed and Distance format: 0: 2D 1: 3D

Bit Number	Definition
10–11	Elevation Source: 0: Positioning System 1: Barometric Air Pressure 2: Database Service (or similar) 3: Other
12	Heading Source 0: Heading based on movement 1: Heading based on magnetic compass
13–15	Reserved for Future Use

Table 3.174: Flags field

3.107 Luminous Efficacy

3.107.1 Description

The Luminous Efficacy characteristic is used to represent a measure of luminous efficacy in units of lumen per watt.

3.107.2 Definition

The structure of this characteristic is defined below:

Field	Data Type	Size (in octets)	Description
Luminous Efficacy	uint16	2	Unit is lumen per watt with a resolution of 0.1. Minimum: 0 Maximum: 1800 Represented values: M = 1, d = -1, b = 0 Unit: org.bluetooth.unit.luminous_efficacy.lumen_per_watt A value of 0xFFFF represents 'value is not known'. All other values are Prohibited.

Table 3.175: Structure of the Luminous Efficacy characteristic

3.108 Luminous Energy

3.108.1 Description

The Luminous Energy characteristic is used to represent a measure of luminous energy in units of lumen hour.

3.108.2 Definition

The structure of this characteristic is defined below:

Field	Data Type	Size (in octets)	Description
Luminous Energy	uint24	3	Unit is lumen hour with a resolution of 1000. Minimum: 0 Maximum: 16777214000 Represented values: M = 1, d = 3, b = 0 Unit: org.bluetooth.unit.luminous_energy.lumen_per_hour A value of 0xFFFFFF represents 'value is not known'. All other values are Prohibited.

Table 3.176: Structure of the Luminous Energy characteristic

3.109 Luminous Exposure

3.109.1 Description

The Luminous Exposure characteristic is used to represent a measure of luminous exposure in units of lux-hour.

3.109.2 Definition

The structure of this characteristic is defined below:

Field	Data Type	Size (in octets)	Description
Luminous Exposure	uint24	3	Unit is lux hour with a resolution of 1000. Minimum: 0 Maximum: 16777214000 Represented values: M = 1, d = 3, b = 0 Unit: org.bluetooth.unit.luminous_exposure.lux_hour A value of 0xFFFFFF represents 'value is not known'. All other values are Prohibited.

Table 3.177: Structure of the Luminous Exposure characteristic

3.110 Luminous Flux

3.110.1 Description

The Luminous Flux characteristic is used to represent a measure of luminous flux in units of lumen.

3.110.2 Definition

The structure of this characteristic is defined below:

Field	Data Type	Size (in octets)	Description
Luminous Flux	uint16	2	Unit is lumen with a resolution of 1 Minimum: 0 Maximum: 65534 Represented values: M = 1, d = 0, b = 0 Unit: org.bluetooth.unit.luminous_flux.lumen A value of 0xFFFFFF represents 'value is not known'. All other values are Prohibited.

Table 3.178: Structure of the Luminous Flux characteristic

3.111 Luminous Flux Range

3.111.1 Description

This characteristic aggregates two instances of the Luminous Flux characteristic to represent a luminous flux range.

3.111.2 Definition

The structure of this characteristic is defined below:

Field	Data Type	Size (in octets)	Description
Minimum Luminous Flux	struct	2	Refer to Luminous Flux characteristic in Section 3.110
Maximum Luminous Flux	struct	2	Refer to Luminous Flux characteristic in Section 3.110

Table 3.179: Structure of the Luminous Flux Range characteristic

3.112 Luminous Intensity

3.112.1 Description

The Luminous Intensity characteristic is used to represent a luminous intensity of a beam of light in units of candela.

3.112.2 Definition

The structure of this characteristic is defined below:

Field	Data Type	Size (in octets)	Description
Luminous Intensity	uint16	2	Unit is candela with a resolution of 1. Minimum: 0 Maximum: 65534 Represented values: M = 1, d = 0, b = 0 Unit: org.bluetooth.unit.luminous_intensity.candela A value of 0xFFFF represents 'value is not known'. All other values are Prohibited.

Table 3.180: Structure of the Luminous Intensity characteristic

3.113 Magnetic Declination

3.113.1 Description

The Magnetic Declination characteristic is used to represent the magnetic declination. The magnetic declination is the angle on the horizontal plane between the direction of True North (geographic) and the direction of Magnetic North, measured clockwise from True North to Magnetic North.

The Magnetic Declination characteristic is a fixed-length structure containing a single Magnetic Declination field.

3.113.2 Definition

The structure of this characteristic is defined below:

Field	Data Type	Size (in octets)	Description
Magnetic Declination	uint16	2	Base Unit: org.bluetooth.unit.plane_angle.degree. Minimum value: 0 Maximum value: 359.99 Represented values: M = 1, d = -2, b = 0 Unit is degrees with a resolution of 0.01 degrees.

Table 3.181: Structure of the Magnetic Declination characteristic

3.114 Magnetic Flux Density - 2D

3.114.1 Description

The Magnetic Flux Density - 2D characteristic is used to represent measurements of magnetic flux density for two orthogonal axes: X and Y.

The Magnetic Flux Density - 2D characteristic is a fixed-length structure containing two fields having the same format. In order of LSO to MSO, the fields are: X-Axis, Y-Axis.

1 x 10^{-7} Tesla equals 0.001 Gauss.

3.114.2 Definition

The structure of this characteristic is defined below:

Field	Data Type	Size (in octets)	Description
X-Axis	sint16	2	Base Unit: org.bluetooth.unit.magnetic_flux_density.tesla Represented values: M = 1, d = -7, b = 0 Unit is 10^{-7} Tesla.
Y-Axis	sint16	2	Base Unit: org.bluetooth.unit.magnetic_flux_density.tesla Represented values: M = 1, d = -7, b = 0 Unit is 10^{-7} Tesla.

Table 3.182: Structure of the Magnetic Flux Density -2D characteristic

3.115 Magnetic Flux Density - 3D

3.115.1 Description

The Magnetic Flux Density - 3D characteristic is used to represent measurements of magnetic flux density for three orthogonal axes: X, Y, and Z.

The Magnetic Flux Density - 3D characteristic is a fixed-length structure containing three fields having the same format. In order of LSO to MSO, the fields are: X-Axis, Y-Axis, and Z-Axis.

1 x 10-7 Tesla equals 0.001 Gauss.

3.115.2 Definition

The structure of this characteristic is defined below:

Field	Data Type	Size (in octets)	Description
X-Axis	sint16	2	Base Unit: org.bluetooth.unit.magnetic_flux_density.tesla Represented values: M = 1, d = -7, b = 0 Unit is 10^{-7} Tesla.
Y-Axis	sint16	2	Base Unit: org.bluetooth.unit.magnetic_flux_density.tesla Represented values: M = 1, d = -7, b = 0 Unit is 10^{-7} Tesla.
Z-Axis	sint16	2	Base Unit: org.bluetooth.unit.magnetic_flux_density.tesla Represented values: M = 1, d = -7, b = 0 Unit is 10^{-7} Tesla.

Table 3.183: Structure of the Magnetic Flux Density - 3D characteristic

3.116 Manufacturer Name String

3.116.1 Description

The value of this characteristic is a UTF-8 string representing the name of the manufacturer of the device.

3.116.2 Definition

The structure of this characteristic is defined in Table 3.184.

Field	Data Type	Size (in octets)	Description
Manufacturer Name	utf8s	variable	

Table 3.184: Manufacturer Name String characteristic

3.117 Mass Flow

3.117.1 Description

The Mass Flow characteristic is used to represent a flow of mass.

3.117.2 Definition

The structure of this characteristic is defined below:

Field	Data Type	Size (in octets)	Description
Mass Flow	uint16	2	Unit is gram/second with a resolution of 1. Minimum: 0 Maximum: 65534 Represented values: M = 1, d = 0, b = 0 Unit: org.bluetooth.unit.mass_flow.gram_per_second A value of 0xFFFF represents 'value is not known'. All other values are Prohibited.

Table 3.185: Structure of the Mass Flow characteristic

3.118 Maximum Recommended Heart Rate

3.118.1 Description

The Maximum Recommended Heart Rate characteristic exposes the maximum recommended heart rate of the current user (i.e. the user that has given consent to access the UDS Characteristics). Maximum

recommended heart rate is a threshold that may be set to limit exertion. The maximum recommended heart rate is smaller or equal to the maximal heart rate a user can reach.

The Maximum Recommended Heart Rate characteristic is a member of the set of “UDS Characteristics” listed in the User Data Service Characteristics Table in the Bluetooth SIG Assigned Numbers (see the User Data Service [5]).

The Maximum Recommended Heart Rate characteristic is a fixed-length structure containing a single field.

3.118.2 Definition

The structure of this characteristic is defined below:

Field	Data Type	Size (in octets)	Description
Maximum Recommended Heart Rate	uint8	1	Unit: org.bluetooth.unit.period.beats_per_minute

Table 3.186: Structure of the Maximum Recommended Heart Rate characteristic

3.119 Measurement Interval

3.119.1 Description

The Measurement Interval characteristic defines the time between measurements.

This characteristic is capable of representing values from 1 second to 65535 seconds which is equal to 18 hours, 12 minutes and 15 seconds.

A special value is defined that may be used to indicate that there is no periodic measurement.

3.119.2 Definition

The structure of this characteristic is defined below:

Field	Data Type	Size (in octets)	Requirement
Measurement Interval	uint16	2	Mandatory field. See Section 3.119.2.1.

Table 3.187: Structure of the Measurement Interval characteristic

3.119.2.1 Measurement Interval field

This field contains either a time duration or, otherwise, a special value:

Key	Description
0	No periodic measurement
1–65535	Duration of measurement interval. Unit: org.bluetooth.unit.time.second

Table 3.188: Measurement Interval field

3.120 Model Number String

3.120.1 Description

The value of this characteristic is a UTF-8 string representing the model number assigned by the device vendor.

3.120.2 Definition

The structure of this characteristic is defined in Table 3.189.

Field	Data Type	Size (in octets)	Description
Model Number	utf8s	variable	

Table 3.189: Model Number String characteristic

3.121 Navigation

3.121.1 Description

The Navigation characteristic is a variable-length structure containing a Flags field, a Bearing field, a Heading field and, based on the contents of the Flags field, a combination of other data fields listed in Table 3.190.

3.121.2 Definition

The structure of this characteristic is defined in Table 3.190.

Field	Data Type	Size (in octets)	Description
Flags	struct	2	See Section 3.121.2.1
Bearing	uint16	2	Base Unit: org.bluetooth.unit.plane_angle.degree Represented values: M = 1, d = -2, b = 0 Unit is 1*10-2 degrees

Field	Data Type	Size (in octets)	Description
Heading	uint16	2	Base Unit: org.bluetooth.unit.plane_angle.degree Represented values: M = 1, d = -2, b = 0 Unit is 1*10-2 degrees
Remaining Distance Present if bit 0 of Flags field set to 1	uint24	3	Base Unit: org.bluetooth.unit.length.metre Represented values: M = 1, d = -1, b = 0 Unit is 1/10 m
Remaining Vertical Distance Present if bit 1 of Flags field set to 1	sint24	3	Base Unit: org.bluetooth.unit.length.metre Represented values: M = 1, d = -2, b = 0 Unit is 1/100 m
Estimated Time of Arrival Present if bit 2 of Flags field set to 1	struct	7	Refer to Date Time characteristic in Section 3.55.

Table 3.190: Navigation characteristic

3.121.2.1 Flags field

The values of this field are defined in Table 3.191.

Bit Number	Definition
0	Remaining Distance Present: 0: False 1: True
1	Remaining Vertical Distance Present: 0: False 1: True
2	Estimated Time of Arrival Present: 0: False 1: True
3–4	Position Status: 0: No Position 1: Position Ok 2: Estimated Position 3: Last Known Position

Bit Number	Definition
5	Heading Source 0: Heading based on movement 1: Heading based on magnetic compass
6	Navigation Indicator Type 0: To Waypoint 1: To Destination
7	Waypoint Reached 0: False 1: True
8	Destination Reached 0: False 1: True
9–15	Reserved for Future Use

Table 3.191: Flags field

3.122 New Alert

3.122.1 Description

This characteristic defines the category of the alert and how many new alerts of that category have occurred in the server device. Brief text information may also be included for the last alert in the category.

3.122.2 Definition

The structure of this characteristic is defined below:

Field	Data Type	Size (in octets)	Description
Category ID	struct	1	Refer to Alert Category ID characteristic in Section 3.1
Number of New Alert	uint8	1	See Section 3.122.2.1
Text String Information	utf8s	Variable 0–18	See Section 3.122.2.2

Table 3.192: Structure of the New Alert characteristic

3.122.2.1 Number of New Alert field

This field provides the number of new alerts in the server.

The range is 0–255.

3.122.2.2 Test String Information field

This field provides brief text information for the last alert.

Note: The usage of the Text String Information field is left to the implementation, but for the best user experience, the recommended text for the category is defined as follows:

Category	Description
Simple Alert	The title of the alert
Email	Sender name
News	Title of the news feed
Call	Caller name or caller ID
Missed Call	Caller name or caller ID
SMS	Sender name or caller ID
Voice Mail	Sender name or caller ID
Schedule	Title of the schedule
High Prioritized Alert	Title of the alert
Instant Messaging	Sender name

Table 3.193: Text String Information category definitions

3.123 Object First Created

3.123.1 Description

The Object First Created characteristic is an object metadata characteristic that exposes a value representing a date and time when the associated object's contents were first created.

The Object First Created characteristic is a fixed-length structure. The format of the data is the same as the format of the Date Time characteristic (org.bluetooth.characteristic.date_time).

3.123.2 Definition

The structure of this characteristic is defined below:

Field	Data Type	Size (in octets)	Description
Object First Created	struct	7	Refer to Date Time characteristic in Section 3.55.

Table 3.194: Structure of the Object First Created characteristic

3.124 Noise

3.124.1 Description

The Noise characteristic is used to represent a measure of sound pressure level in units of decibel.

3.124.2 Definition

The structure of this characteristic is defined below:

Field	Data Type	Size (in octets)	Description
Noise	uint8	1	Unit is decibel with a resolution of 1. Unit: org.bluetooth.unit.sound_pressure.decibel_spl Allowed range is: 0 to 253. A value of 0xFE represents 'value is 254 or greater'. A value of 0xFF represents 'value is not known'.

Table 3.195: Structure of the Noise characteristic

3.125 Object ID

3.125.1 Description

The Object ID characteristic is an object metadata characteristic that exposes an integer value representing an object ID for the associated object.

The Object ID characteristic is a fixed-length structure containing a single Object ID field.

3.125.2 Definition

The structure of this characteristic is defined below:

Field	Data Type	Size (in octets)	Description
Object ID	uint48	6	See Section 3.125.2.1.

Table 3.196: Structure of the Object ID characteristic

3.125.2.1 Object ID field

The enumeration of this field is defined as follows:

Enumeration	Definition
0	The value 0x000000000000 is reserved for a specific use as defined in the Object Transfer Service, Section 3.2.7.
1–255	The values 0x000000000001–0x0000000000FF are reserved for future use.
> 255	The values 0x000000000100–0xFFFFFFFFFFFF may be used as object IDs.

Table 3.197: Object ID field

3.126 Object Last Modified

3.126.1 Description

The Object Last Modified characteristic is an object metadata characteristic that exposes a value representing a date and time when the associated object's contents were last modified.

The Object Last Modified characteristic is a fixed-length structure. The format of the data is the same as the format of the Date Time characteristic (org.bluetooth.characteristic.date_time).

3.126.2 Definition

The structure of this characteristic is defined below:

Field	Data Type	Size (in octets)	Description
Object Last Modified	struct	7	Refer to Date Time characteristic in Section 3.55.

Table 3.198: Structure of the Object Last Modified characteristic

3.127 Object Name

3.127.1 Description

The Object Name characteristic is an object metadata characteristic that exposes the name of the associated object.

The Object Name characteristic is a variable-length structure containing a single Object Name field. The length of the field value varies from 0 octets to a maximum of 120 octets.

Note: Characters that require more than one octet when encoded in UTF-8 are transmitted with the leading byte first, followed by the continuation bytes ordered in accordance with UTF-8 encoding. In UTF-8, the leading byte is identified by possessing two or more high-order 1's followed by a 0 while continuation bytes all have '10' in the high-order position. Strings that consist of more than one character are transmitted in the following order: the character that appears furthest to the left when the string is presented in its written form shall be sent first, followed by the remaining characters in order.

3.127.2 Definition

The structure of this characteristic is defined below:

Field	Data Type	Size (in octets)	Description
Object Name	utf8s	0–120	UTF-8 string

Table 3.199: Structure of the Object Name characteristic

3.128 Object Type

3.128.1 Description

The Object Type characteristic is an object metadata characteristic that exposes the type of the associated object, representing this with a UUID.

The Object Type characteristic has two possible lengths, depending on whether the UUID conveyed is a 16-bit or 128-bit UUID.

3.128.2 Definition

The structure of this characteristic is defined below:

Field	Data Type	Size (in octets)	Description
Object Type	gatt_uuid	2 or 16	Object Type UUIDs that use the 16-bit format are defined in the Bluetooth SIG Assigned Numbers. Object Type UUIDs that use the 128-bit format may be proprietary UUIDs.

Table 3.200: Structure of the Object Type characteristic

3.129 Perceived Lightness

3.129.1 Description

The Perceived Lightness characteristic is used to represent the perceived lightness of a light.

3.129.2 Definition

The structure of this characteristic is defined below:

Field	Data Type	Size (in octets)	Description
Perceived Lightness	uint16	2	Unit is unitless with a resolution of 1. Minimum: 0 Maximum: 65535 Represented values: M = 1, d = 0, b = 0

Table 3.201: Structure of the Perceived Lightness characteristic

3.130 Percentage 8

3.130.1 Description

The Percentage 8 characteristic is used to represent a measure of percentage.

3.130.2 Definition

The structure of this characteristic is defined below:

Field	Data Type	Size (in octets)	Description
Percentage 8	uint8	1	Unit is a percentage with a resolution of 0.5. Minimum: 0 Maximum: 100 Represented values: M = 1, d = 0, b = -1 Unit: org.bluetooth.unit.percentage A value of 0xFF represents 'value is not known'. All other values are Prohibited.

Table 3.202: Structure of the Percentage 8 characteristic

3.131 PnP ID

3.131.1 Description

The PnP ID characteristic is a set of values that is used to create a device ID value that is unique for this device. Included in the characteristic is a Vendor ID Source field, a Vendor ID field, a Product ID field and a Product Version field. These values are used to identify all devices of a given type/model/version using numbers.

3.131.2 Definition

The structure of this characteristic is defined in Table 3.203.

Fields	Data Type	Size (in octets)	Description
Vendor ID Source	uint8	1	See Section 3.131.2.1
Vendor ID	uint16	2	Identifies the product vendor from the namespace in the Vendor ID Source

Fields	Data Type	Size (in octets)	Description
Product ID	uint16	2	Manufacturer managed identifier for this product
Product Version	uint16	2	Manufacturer managed version for this product

Table 3.203: PnP ID characteristic

3.131.2.1 Vendor ID Source field

The values of this field are defined in Table 3.204.

Key	Description
0	Reserved for Future Use
1	Bluetooth SIG assigned Company Identifier value from the Assigned Numbers document
2	USB Implementer's Forum assigned Vendor ID value
3–255	Reserved for Future Use

Table 3.204: PnP ID characteristic Vendor ID Source field

3.132 Pollen Concentration

3.132.1 Description

The Pollen Concentration characteristic is used to represent the pollen count.

The Pollen Concentration characteristic is a fixed-length structure containing a single Pollen Concentration field.

3.132.2 Definition

The structure of this characteristic is defined below:

Field	Data Type	Size (in octets)	Description
Pollen Concentration	uint24	3	Unit: org.bluetooth.unit.concentration.count_per_cubic_metre

Table 3.205: Structure of the Pollen Concentration characteristic

3.133 Position Quality

3.133.1 Description

The Position Quality characteristic is a variable-length structure containing a Flags field and at least one of the optional data fields listed in Table 3.206.

3.133.2 Definition

The structure of this characteristic is defined in Table 3.206.

Fields	Data Type	Size (in octets)	Description
Flags	struct	2	See Section 3.133.2.1
Number of Beacons in Solution Present if bit 0 of Flags field set to 1	uint8	1	Unit: org.bluetooth.unit.unitless
Number of Beacons in View Present if bit 1 of Flags field set to 1	uint8	1	Unit: org.bluetooth.unit.unitless
Time to First Fix Present if bit 2 of Flags field set to 1	uint16	2	Base Unit: org.bluetooth.unit.time.second Represented values: M = 1, d = -1, b = 0 Unit is 1/10 seconds
EHPE Present if bit 3 of Flags field set to 1	uint32	4	Base Unit: org.bluetooth.unit.length.metre Represented values: M = 1, d = -2, b = 0 Unit is 1/100 m
EVPE Present if bit 4 of Flags field set to 1	uint32	4	Base Unit: org.bluetooth.unit.length.metre Represented values: M = 1, d = -2, b = 0 Unit is 1/100 m
HDOP Present if bit 5 of Flags field set to 1	uint8	1	Base Unit: org.bluetooth.unit.unitless Represented values: M = 2, d = -1, b = 0
VDOP Present if bit 6 of Flags field set to 1	uint8	1	Base Unit: org.bluetooth.unit.unitless Represented values: M = 2, d = -1, b = 0

Table 3.206: Position Quality characteristic

3.133.2.1 Flags field

The values of this field are defined in Table 3.207.

Bit Number	Definition
0	Number of Beacons in Solution Present 0: False 1: True

Bit Number	Definition
1	Number of Beacons in View Present 0: False 1: True
2	Time to First Fix Present 0: False 1: True
3	EHPE Present: 0: False 1: True
4	EVPE Present: 0: False 1: True
5	HDOP Present: 0: False 1: True
6	VDOP Present: 0: False 1: True
7–8	Position Status, enumeration where bit 7 is the LSB and bit 8 is the MSB: 0: No Position 1: Position Ok 2: Estimated Position 3: Last Known Position
9–15	Reserved for Future Use

Table 3.207: Flags field

3.134 Power

3.134.1 Description

The Power characteristic is used to represent a measure of power in units of watts.

3.134.2 Definition

The structure of this characteristic is defined below:

Field	Data Type	Size (in octets)	Description
Power	uint24	3	Unit is watt with a resolution of 0.1. Minimum: 0 Maximum: 1677721.4 Represented values: M = 1, d = -1, b = 0 Unit: org.bluetooth.unit.power.watt A value of 0xFFFFFF represents 'value is not known'. All other values are Prohibited.

Table 3.208: Structure of the Pressure characteristic

3.135 Power Specification

3.135.1 Description

This characteristic aggregates three instances of the Power characteristic to represent a specification of Power values.

3.135.2 Definition

The structure of this characteristic is defined below:

Field	Data Type	Size (in octets)	Description
Minimum Power Value	struct	3	Refer to Power characteristic in Section 3.134
Typical Power Value	struct	3	Refer to Power characteristic in Section 3.134
Maximum Power Value	struct	3	Refer to Power characteristic in Section 3.134

Table 3.209: Structure of the Power Specification characteristic

3.136 Pressure

3.136.1 Description

The Pressure characteristic is used to represent pressure.

The Pressure characteristic is a fixed-length structure containing a single Pressure field.

3.136.2 Definition

The structure of this characteristic is defined below:

Field	Data Type	Size (in octets)	Description
Pressure	uint32	4	Base Unit: org.bluetooth.unit.pressure.pascal Represented values: M = 1, d = -1, b = 0 Unit is Pascals with a resolution of 0.1 Pa

Table 3.210: Structure of the Pressure characteristic

3.137 Rainfall

3.137.1 Description

The Rainfall characteristic is used to represent the amount of rain that has fallen.

The Rainfall characteristic is a fixed-length structure containing a single Rainfall field.

3.137.2 Definition

The structure of this characteristic is defined below:

Field	Data Type	Size (in octets)	Description
Rainfall	uint16	2	Base Unit: org.bluetooth.unit.length.meter Represented values: M = 1, d = -3, b = 0 Unit is meters with a resolution of 1mm

Table 3.211: Structure of the Rainfall characteristic

3.138 Record Access Control Point

3.138.1 Description

This control point is used with a service to provide basic management functionality for a record database. This enables functions including counting records, transmitting records and clearing records based on filter criterion. The filter criterion in the Operand field is defined by the service that references this characteristic, as is the format of a record (which may be comprised of one or more characteristics) and the sequence of transferred records.

3.138.2 Definition

The structure of this characteristic is defined in Table 3.212:

Field	Data Type	Size (in octets)	Description
Op Code	uint8	1	See Table 3.213
Operator	uint8	1	See Table 3.214
Operand	struct	0–18	See Table 3.215

Table 3.212: Record Access Control Point characteristic

3.138.2.1 Op Code, Operator, and Operand/Filter fields

The Op Code values and associated Operator and Operand values are defined as shown in Table 3.213:

Op Code Value	Definition	Operator	Operand	Description
0x00	Reserved for Future Use	N/A	N/A	N/A
0x01	Report stored records	Value from Operator table	Filter parameters (as appropriate to Operator and Service)	Following record transmission, the response to this control point is Op Code 0x06.
0x02	Delete stored records	Value from Operator table	Filter parameters (as appropriate to Operator and Service)	The response to this control point is Op Code 0x06.
0x03	Abort operation	Null	Not included	The response to this control point is Op Code 0x06.
0x04	Report number of stored records	Value from Operator table	Filter parameters (as appropriate to Operator and Service)	The normal response to this control point is Op Code 0x05. For error conditions, the response is Op Code 0x06.
0x05	Number of stored records response	Null	Number of Records (Field size defined by Service)	This is the normal response to Op Code 0x04.
0x06	Response Code	Null	Request Op Code, Response Code Value	See Table 3.216
0x07–0xFF	Reserved for Future Use	N/A	N/A	N/A

Table 3.213: Record Access Control Point characteristic Op Code Values

The Operator values are defined in Table 3.214 below:

Operator Value	Definition	Operand Notes
0x00	Null	Varies by Op Code
0x01	All records	No Operand used
0x02	Less than or equal to	Operand contains at least a maximum value

Operator Value	Definition	Operand Notes
0x03	Greater than or equal to	Operand contains at least a minimum value
0x04	Within range of (inclusive)	Operand contains at least a minimum value, maximum value pair
0x05	First record (i.e. oldest record)	No Operand used
0x06	Last record (i.e. most recent record)	No Operand used
0x07–0xFF	Reserved for Future Use	N/A

Table 3.214: Record Access Control Point characteristic Operator Values

The operands and filter types (“Operand” column of Table 3.213) correspond to the Op Code values (0x00–0xFF) defined in the Op Code field (also from Table 3.213).

Key	Operand Value
0x00	N/A
0x01	Filter parameters (as appropriate to Operator and Service)
0x02	Filter parameters (as appropriate to Operator and Service)
0x03	Not included
0x04	Filter parameters (as appropriate to Operator and Service)
0x05	Number of Records (Field size defined per service)
0x06	Request Op Code, Response Code Value
0x07–0xFF	Reserved for Future Use

Table 3.215: Op Code Operand/Filter Correspondence

The Response Code values associated with Op Code 0x06 are defined as follows:

Response Code Value	Definition	Description
0x00	Reserved for Future Use	N/A
0x01	Success	Normal response for successful operation.
0x02	Op Code not supported	Normal response if unsupported Op Code is received.
0x03	Invalid Operator	Normal response if Operator received does not meet the requirements of the service (e.g., Null was expected).

Response Code Value	Definition	Description
0x04	Operator not supported	Normal response if unsupported Operator is received.
0x05	Invalid Operand	Normal response if Operand received does not meet the requirements of the service.
0x06	No records found	Normal response if request for records resulted in no records meeting criteria.
0x07	Abort unsuccessful	Normal response if request for Abort cannot be completed.
0x08	Procedure not completed	Normal response if unable to complete a procedure for any reason.
0x09	Operand not supported	Normal response if unsupported Operand is received.
0x0A–0xFF	Reserved for Future Use	N/A

Table 3.216: Record Access Control Point characteristic Response Code Values

3.139 Reference Time Information

3.139.1 Description

The Reference Time Information characteristic is used to provide information about the reference time source.

3.139.2 Definition

The structure of this characteristic is defined below:

Field	Data Type	Size (in octets)	Description
Time Source	struct	1	Refer to Time Source characteristic in Section 3.169
Time Accuracy	struct	1	Refer to Time Accuracy characteristic in Section 3.167
Days Since Update	uint8	1	See Section 3.139.2.1
Hours Since Update	uint8	1	See Section 3.139.2.1

Table 3.217: Structure of the Reference Time Information characteristic

3.139.2.1 Days Since Update and Hours Since Update fields

Time span in days and hours since the last update from the reference.

Valid range for days is from 0 to 254.

Valid range for hours from 0 to 23.

The value of 255 in both Days Since Update and Hours Since Update is used to represent a time span longer than or equal to 255 days.

All other values are reserved for future use.

3.140 Relative Runtime In A Current Range

3.140.1 Description

This characteristic aggregates the Percentage 8 characteristic and two instances of the Electric Current characteristic to represent a relative value in an electric current range.

3.140.2 Definition

The structure of this characteristic is defined below:

Field	Data Type	Size (in octets)	Description
Relative Runtime Value	struct	1	Refer to Percentage 8 characteristic in Section 3.130
Minimum Current	struct	2	Refer to Electric Current characteristic in Section 3.61
Maximum Current	struct	2	Refer to Electric Current characteristic in Section 3.61

Table 3.218: Structure of the Relative Runtime In A Current Range characteristic

3.141 Relative Runtime In A Generic Level Range

3.141.1 Description

This characteristic aggregates the Percentage 8 characteristic and two instances of the Generic Level characteristic to represent a runtime in a generic level range.

3.141.2 Definition

The structure of this characteristic is defined below:

Field	Data Type	Size (in octets)	Description
Relative Value	struct	1	Refer to Percentage 8 characteristic in Section 3.130
Minimum Generic Level	struct	2	Refer to Generic Level characteristic in Section 3.82
Maximum Generic Level	struct	2	Refer to Generic Level characteristic in Section 3.82

Table 3.219: Structure of the Relative Runtime In A Generic Level Range characteristic

3.142 Relative Value In A Voltage Range

3.142.1 Description

This characteristic aggregates the Percentage 8 characteristic and two instances of the Voltage characteristic to represent a relative value in a voltage range.

3.142.2 Definition

The structure of this characteristic is defined below:

Field	Data Type	Size (in octets)	Description
Relative Value	struct	1	Refer to Percentage 8 characteristic in Section 3.130
Minimum Voltage	struct	2	Refer to Voltage characteristic in Section 3.188
Maximum Voltage	struct	2	Refer to Voltage characteristic in Section 3.188

Table 3.220: Structure of the Relative Value In A Voltage Range characteristic

3.143 Relative Value In An Illuminance Range

3.143.1 Description

This characteristic aggregates the Percentage 8 characteristic and two instances of the Illuminance characteristic to represent a relative value in a illuminance range.

3.143.2 Definition

The structure of this characteristic is defined below:

Field	Data Type	Size (in octets)	Description
Relative Value	struct	1	Refer to Percentage 8 characteristic in Section 3.130
Minimum Voltage	struct	2	Refer to Illuminance characteristic in Section 3.97
Maximum Voltage	struct	2	Refer to Illuminance characteristic in Section 3.97

Table 3.221: Structure of the Relative Value In An Illuminance Range characteristic

3.144 Relative Value In A Period Of Day

3.144.1 Description

This characteristic aggregates the Percentage 8 characteristic, and two instances of the Time Decihour 8 characteristic.

3.144.2 Definition

The structure of this characteristic is defined below:

Field	Data Type	Size (in octets)	Description
Relative Value	struct	1	Refer to Percentage 8 characteristic in Section 3.130
Start Time	struct	1	Refer to Time Decihour 8 characteristic in Section 3.169
End Time	struct	1	Refer to Time Decihour 8 characteristic in Section 3.169

Table 3.222: Structure of the Relative Value In A Period Of Day characteristic

3.145 Relative Value In A Temperature Range

3.145.1 Description

This characteristic aggregates the Percentage 8 characteristic, and two instances of the Temperature characteristic.

3.145.2 Definition

The structure of this characteristic is defined below:

Field	Data Type	Size (in octets)	Description
Relative Value	struct	1	Refer to Percentage 8 characteristic in Section 3.130
Minimum Temperature Value	struct	1	Refer to Temperature characteristic in Section 3.159
Maximum Temperature Value	struct	1	Refer to Temperature characteristic in Section 3.159

Table 3.223: Structure of the Relative Value In A Temperature Range characteristic

3.146 Resting Heart Rate

3.146.1 Description

The Resting Heart Rate characteristic exposes the resting heart rate of the current user (i.e. the user that has given consent to access the UDS Characteristics).

The Resting Heart Rate characteristic is a member of the set of “UDS Characteristics” listed in the User Data Service Characteristics Table in the Bluetooth SIG Assigned Numbers (see the User Data Service [5]).

The Resting Heart Rate characteristic is a fixed-length structure containing a single field.

3.146.2 Definition

The structure of this characteristic is defined below:

Field	Data Type	Size (in octets)	Description
Resting Heart Rate	uint8	1	Unit: org.bluetooth.unit.period.beats_per_minute

Table 3.224: Structure of the Resting Heart Rate characteristic

3.147 Ringer Control Point

3.147.1 Description

The Ringer Control Point characteristic defines the Control Point of Ringer.

3.147.2 Definition

The structure of this characteristic is defined below:

Field	Data Type	Size (in octets)	Description
Ringer Control Point	uint8	1	See Section 3.147.2.1

Table 3.225: Structure of the Ringer Control Point characteristic

3.147.2.1 Ringer Control Point field

The following values are defined for the Ringer Control Point field:

Description	Value
Silent Mode	1
Mute Once	2
Cancel Silent Mode	3
Reserved for Future Use	0 and 4–255

Table 3.226: Ringer Control Point field

3.148 Ringer Setting

3.148.1 Description

The Ringer Setting characteristic defines the setting of the ringer.

3.148.2 Definition

The structure of this characteristic is defined below:

Field	Data Type	Size (in octets)	Description
Ringer Setting	uint8	1	See Section 3.148.2.1

Table 3.227: Structure of the Ringer Setting characteristic

3.148.2.1 Ringer Setting field

The following values are defined for the Ringer Setting field:

Description	Value
Ringer Silent	0
Ringer Normal	1
Reserved for Future Use	2–255

Table 3.228: Ringer Setting field

3.149 RSC Feature

3.149.1 Description

The RSC Feature characteristic is used to describe the supported features of the Running Speed and Cadence (RSC) sensor.

The RSC Feature characteristic is a fixed-length structure containing a single RSC Feature field.

3.149.2 Definition

The structure of this characteristic is defined in Table 3.229.

Field	Data Type	Size (in octets)	Description
RSC Feature	struct	2	See Section 3.149.2.1

Table 3.229: RSC Feature characteristic

3.149.2.1 RSC Feature field

The bits of this field are defined in Table 3.230.

Bit Number	Definition
0	Instantaneous Stride Length Measurement Supported 0 = False 1 = True
1	Total Distance Measurement Supported 0 = False 1 = True
2	Walking or Running Status Supported 0 = False 1 = True
3	Calibration Procedure Supported 0 = False 1 = True
4	Multiple Sensor Locations Supported 0 = False 1 = True
5–15	Reserved for Future Use

Table 3.230: RSC Feature field

3.150 RSC Measurement

3.150.1 Description

The RSC Measurement characteristic is a variable-length structure containing a Flags field, an Instantaneous Speed field, an Instantaneous Cadence field, and, based on the contents of the Flags field, an Instantaneous Stride Length field and a Total Distance field.

3.150.2 Definition

The structure of this characteristic is defined in Table 3.231.

Field	Data Type	Size (in octets)	Description
Flags	struct	1	See Section 3.150.2.1
Instantaneous Speed	uint16	2	Base Unit: org.bluetooth.unit.velocity.metres_per_second Represented values: M = 1, d = 0, b = -8 Unit is 1/256th of a m/s
Instantaneous Cadence	uint8	1	Unit is 1/min
Instantaneous Stride Length Present if bit 0 of Flags field set to 1	uint16	2	Base Unit: org.bluetooth.unit.length.metre Represented values: M = 1, d = -2, b = 0 Unit is Centimeter
Total Distance Present if bit 1 of Flags field set to 1	uint32	4	Base Unit: org.bluetooth.unit.length.metre Represented values: M = 1, d = -1, b = 0 Unit is 1/10 m

Table 3.231: RSC Measurement characteristic

3.150.2.1 Flags field

The values of this field are defined in Table 3.232.

Bit Number	Definition
0	Instantaneous Stride Length Present: 0: False 1: True
1	Total Distance Present: 0: False 1: True

Bit Number	Definition
2	Walking or Running Status: 0: Walking 1: Running
3–7	Reserved for Future Use

Table 3.232: Flags field

3.151 SC Control Point

3.151.1 Description

The SC Control Point characteristic is used to request a specific function to be executed on the receiving device.

3.151.2 Definition

The structure of this characteristic is defined in Table 3.233.

Field	Data Type	Size (in octets)	Description
Op Code	uint8	1	See Section 3.151.2.1
Parameter	struct	0–18	See Section 3.151.2.1

Table 3.233: SC Control Point characteristic

3.151.2.1 Op Code and Parameter field

The values of these fields are defined in Table 3.234.

Op Code Value	Definition	Parameter	Parameter Type	Description
0x00	Reserved for Future Use	N/A	N/A	N/A
0x01	Set Cumulative Value	Cumulative Value as defined per service	Defined per service	Initiate the procedure to set a cumulative value. The new value is sent as parameter following op code (parameter defined per service). The response to this control point is Op Code 0x10 followed by the appropriate Response Value.

Op Code Value	Definition	Parameter	Parameter Type	Description
0x02	Start Sensor Calibration	N/A	N/A	Starts the calibration of the sensor. The response to this control point is Op Code 0x10 followed by the appropriate Response Value.
0x03	Update Sensor Location	Sensor Location Value (see Section 3.152.2.1)	Uint8	Update to the location of the sensor with the value sent as parameter to this op code. The response to this control point is Op Code 0x10 followed by the appropriate Response Value.
0x04	Request Supported Sensor Locations	N/A	N/A	Request a list of supported locations where the sensor can be attached. The response to this control point is Op Code 0x10 followed by the appropriate Response Value, including a list of supported sensor locations (see Section 3.152) in the Response Parameter.
0x05–0x0F	Reserved for Future Use	N/A	N/A	N/A
0x10	Response Code	Request Op Code, Response Code Value	N/A	See Section 3.151.2.2
0x11–0xFF	Reserved for Future Use	N/A	N/A	N/A

Table 3.234: SC Control Point Op Code and Parameter field

3.151.2.2 Response Code Values

The Response Code Values associated with the SC Control Point are defined in Table 3.235.

Response Code Value	Definition	Response Parameter	Description
0x00	Reserved For Future Use	N/A	N/A
0x01	Success	Defined per service	Normal response for successful operation.
0x02	Op Code not supported	N/A	Response if unsupported Op Code is received

Response Code Value	Definition	Response Parameter	Description
0x03	Invalid Operand	N/A	Response if Parameter received does not meet the requirements of the service.
0x04	Operation Failed	N/A	Response if the requested procedure failed.
0x05–0xFF	Reserved for Future Use		N/A

Table 3.235: SC Control Point Response Code Values

3.152 Sensor Location

3.152.1 Description

The Sensor Location characteristic is used to expose the location of the sensor.

3.152.2 Definition

The structure of this characteristic is defined in Table 3.236.

Fields	Data Type	Size (in octets)	Description
Sensor Location	uint8	1	See Section 3.152.2.1

Table 3.236: Sensor Location characteristic

3.152.2.1 Sensor Location field

The values of this field are defined in Table 3.237.

Key	Value
0	Other
1	Top of shoe
2	In shoe
3	Hip
4	Front Wheel
5	Left Crank
6	Right Crank
7	Left Pedal
8	Right Pedal
9	Front Hub

Key	Value
10	Rear Dropout
11	Chainstay
12	Rear Wheel
13	Rear Hub
14	Chest
15	Spider
16	Chain Ring
17–255	Reserved for Future Use

Table 3.237: Sensor Location field

3.153 Serial Number String

3.153.1 Description

The value of this characteristic is a variable-length UTF-8 string representing the serial number for a particular instance of the device.

3.153.2 Definition

The structure of this characteristic is defined in Table 3.238.

Field	Data Type	Size (in octets)	Description
Serial Number	utf8s	variable	

Table 3.238: Serial Number String characteristic

3.154 Software Revision String

3.154.1 Description

The value of this characteristic is a UTF-8 string representing the software revision for the software within the device.

3.154.2 Definition

The structure of this characteristic is defined in Table 3.239.

Fields	Data Type	Size (in octets)	Description
Software Revision	utf8s	variable	

Table 3.239: Software Revision String characteristic

3.155 Sport Type For Aerobic And Anaerobic Thresholds

3.155.1 Description

The Sport Type For Aerobic And Anaerobic Thresholds characteristic exposes the sport type applicable to aerobic and anaerobic thresholds for the current user (i.e. the user that has given consent to access the UDS Characteristics). The Sport Type For Aerobic And Anaerobic Thresholds characteristic value identifies how the measurement(s) were performed.

The Sport Type For Aerobic And Anaerobic Thresholds characteristic is a member of the set of “UDS Characteristics” listed in the User Data Service Characteristics Table in the Bluetooth SIG Assigned Numbers (see the User Data Service [5]). The Aerobic Threshold and Anaerobic Threshold characteristics together with the Sport Type For Aerobic And Anaerobic Thresholds characteristic describe the metabolic thresholds of the user.

The Sport Type For Aerobic And Anaerobic Thresholds characteristic is a fixed-length structure containing a single field.

3.155.2 Definition

The structure of this characteristic is defined below:

Field	Data Type	Size (in octets)	Description
Sport Type For Aerobic And Anaerobic Thresholds	uint8	1	See Section 3.155.2.1.

Table 3.240: Structure of the Sport Type For Aerobic And Anaerobic Thresholds characteristic

3.155.2.1 Sport Type For Aerobic And Anaerobic Thresholds field

The enumeration of the Sport Type For Aerobic And Anaerobic Thresholds field is defined as follows:

Enumeration	Definition
0	Unspecified

Enumeration	Definition
1	Running (Treadmill)
2	Cycling (Ergometer)
3	Rowing (Ergometer)
4	Cross Training (Elliptical)
5	Climbing
6	Skiing
7	Skating
8	Arm exercising
9	Lower body exercising
10	Upper body exercising
11	Whole body exercising
12–225	Reserved for Future Use

Table 3.241: Sport Type For Aerobic And Anaerobic Thresholds field

3.156 Supported New Alert Category

3.156.1 Description

The Supported New Alert Category characteristic is the category that the server supports for a new alert.

3.156.2 Definition

The structure of this characteristic is defined below:

Field	Data Type	Size (in octets)	Description
Category ID Bit Mask	struct	1–2	Refer to Alert Category ID Bit Mask characteristic in Section 3.6

Table 3.242: Structure of the Supported New Alert Category characteristic

3.157 Supported Unread Alert Category

3.157.1 Description

The Supported Unread Alert Category characteristic is the category that the server supports for an unread alert.

3.157.2 Definition

The structure of this characteristic is defined below:

Field	Data Type	Size (in octets)	Description
Category ID Bit Mask	struct	1–2	Refer to Alert Category ID Bit Mask characteristic in Section 3.6

Table 3.243: Structure of the Supported Unread Alert Category characteristic

3.157.2.1 Category ID Bit Mask

This field is an instance of the Alert Category ID Bit Mask characteristic; see Section 3.6.

3.158 System ID

3.158.1 Description

The System ID characteristic consists of a structure with two fields. The first field contains the LSOs and the second field contains the MSOs.

This is a 64-bit structure which consists of a 40-bit manufacturer-defined identifier concatenated with a 24-bit unique Organizationally Unique Identifier (OUI). The OUI is issued by the IEEE Registration Authority (http://standards.ieee.org/regauth/index.html) and is required to be used in accordance with IEEE Standard 802-2001.6 while the least significant 40 bits are manufacturer defined.

If System ID is generated based on a Bluetooth Device Address, it shall be done as follows. System ID and the Bluetooth Device Address have a very similar structure: a Bluetooth Device Address is 48 bits in length and consists of a 24-bit Company Assigned Identifier (manufacturer-defined identifier) concatenated with a 24-bit Company Identifier (OUI). In order to encapsulate a Bluetooth Device Address as System ID, the Company Identifier is concatenated with 0xFFFE followed by the Company Assigned Identifier of the Bluetooth Address. For more guidelines related to EUI-64, refer to http://standards.ieee.org/develop/regauth/tut/eui64.pdf.

3.158.1.1 Example

If the System ID is based on a Bluetooth Device Address with a Company Identifier (OUI) of 0x123456 and the Company Assigned Identifier is 0x9ABCDE, then the System Identifier is required to be 0x123456FFFE9ABCDE.

3.158.2 Definition

The structure of this characteristic is defined in Table 3.244.

Field	Data Type	Size (in octets)	Description
Manufacturer Identifier	struct	5	40-bit manufacturer-defined identifier

Field	Data Type	Size (in octets)	Description
Organizationally Unique Identifier	uint24	3	24-bit unique Organizationally Unique Identifier

Table 3.244: System ID characteristic

3.159 Temperature

3.159.1 Description

The Temperature characteristic is used to represent a temperature.

The Temperature characteristic is a fixed-length structure containing a single Temperature field.

3.159.2 Definition

The structure of this characteristic is defined below:

Field	Data Type	Size (in octets)	Description
Temperature	sint16	2	Base Unit: org.bluetooth.unit.thermodynamic_temperature.degree_celsius Represented values: M = 1, d = -2, b = 0 Unit is degrees Celsius with a resolution of 0.01 degrees Celsius. Allowed range is: -273.15 to 327.67. A value of 0x8000 represents ‘value is not known’. All other values are prohibited.

Table 3.245: Structure of the Temperature characteristic

3.160 Temperature 8

3.160.1 Description

The Temperature 8 characteristic is used to represent a measure of temperature with a unit of 0.5 degree Celsius.

3.160.2 Definition

The structure of this characteristic is defined below:

Field	Data Type	Size (in octets)	Description
Temperature 8	sint8	1	Unit is degree Celsius with a resolution of 0.5. Minimum: -64.0 Maximum: 63.5 Represented values: M = 1, d = 0, b = -1

Field	Data Type	Size (in octets)	Description
			Unit: org.bluetooth.unit.thermodynamic_temperature.degree_celsius A value of 0xFF represents 'value is not known'

Table 3.246: Structure of the Temperature 8 characteristic

3.161 Temperature 8 In A Period Of Day

3.161.1 Description

This characteristic aggregates the Temperature 8 characteristic, and two instances of the Time Decihour 8 characteristic, to represent a temperature value in a period of day.

3.161.2 Definition

The structure of this characteristic is defined below:

Field	Data Type	Size (in octets)	Description
Temperature	struct	1	Refer to Temperature 8 characteristic in Section 3.160
Start Time	struct	1	Refer to Time Decihour 8 characteristic in Section 3.169
End Time	struct	1	Refer to Time Decihour 8 characteristic in Section 3.169

Table 3.247: Structure of the Temperature 8 In A Period Of Day characteristic

3.162 Temperature 8 Statistics

3.162.1 Description

This characteristic aggregates four instances of the Temperature 8 characteristic, and one instance of the Time Exponential 8 characteristic.

3.162.2 Definition

The structure of this characteristic is defined below:

Field	Data Type	Size (in octets)	Description
Average	struct	1	Refer to Temperature 8 characteristic in Section 3.160
Standard Deviation Value	struct	1	Refer to Temperature 8 characteristic in Section 3.160

Field	Data Type	Size (in octets)	Description
Minimum Value	struct	1	Refer to Temperature 8 characteristic in Section 3.160
Maximum Value	struct	1	Refer to Temperature 8 characteristic in Section 3.160
Sensing Duration	struct	1	Refer to Time Exponential 8 characteristic in Section 3.170

Table 3.248: Structure of the Temperature 8 Statistics characteristic

3.163 Temperature Measurement

3.163.1 Description

The Temperature Measurement characteristic is a variable-length structure containing a Flags field, Temperature Measurement Value field, and, based upon the contents of the Flags field, an optional Time Stamp field and/or Temperature Type field.

3.163.2 Definition

The structure of this characteristic is defined below:

Field	Data Type	Size (in octets)	Requirement
Flags	struct	1	See Section 3.163.2.1.
Temperature Measurement Value (Celsius) Present if Flags field bit 0 = 0	FLOAT	0 or 4	This field contains a measurement value. Unit: org.bluetooth.unit.thermodynamic_temperature.degree_celsius. Note: This field is only included if the flags bit 0 is 0.
Temperature Measurement Value (Fahrenheit) Present if Flags field bit 0 = 1	FLOAT	0 or 4	This field contains a measurement value. Unit: org.bluetooth.unit.thermodynamic_temperature.degree_fahrenheit. Note: This field is only included if the flags bit 0 is 1.
Time Stamp Present if Flags field bit 1 = 1	struct	0 or 7	Refer to Date Time characteristic in Section 3.55.

Field	Data Type	Size (in octets)	Requirement
Temperature Type Present if Flags field bit 2 = 1	uint8	0 or 1	The format of this field is the same as the format of the value of the Temperature Type org.bluetooth.characteristic.temperature_type. Refer to the Temperature Type characteristic in Section 3.164. Note: If the flags bit 2 is set to 1 this field is included. If it is 0, this field is not included.

Table 3.249: Structure of the Temperature Measurement characteristic

3.163.2.1 Flags field

The bits of this field are defined as:

Bit Number	Definition
0	Temperature Units Flag 0 = Temperature Measurement Value in units of Celsius 1 = Temperature Measurement Value in units of Fahrenheit
1	Time Stamp Flag 0 = Time Stamp field not present 1 = Time Stamp field present
2	Temperature Type Flag 0 = Temperature Type field not present 1 = Temperature Type field present
3–7	Reserved for Future Use

Table 3.250: Flags field

3.164 Temperature Range

3.164.1 Description

This characteristic aggregates two instances of the Temperature characteristic to represent a temperature range.

3.164.2 Definition

The structure of this characteristic is defined below:

Field	Data Type	Size (in octets)	Description
Minimum Temperature	struct	2	Refer to Temperature characteristic in Section 3.159

Field	Data Type	Size (in octets)	Description
Maximum Temperature	struct	2	Refer to Temperature characteristic in Section 3.159

Table 3.251: Structure of the Temperature Range characteristic

3.165 Temperature Statistics

3.165.1 Description

This characteristic aggregates four instances of the Temperature characteristic, and one instance of the Time Exponential 8 characteristic.

3.165.2 Definition

The structure of this characteristic is defined below:

Field	Data Type	Size (in octets)	Description
Average Temperature	struct	2	Refer to Temperature characteristic in Section 3.159
Standard Deviation Temperature	struct	2	Refer to Temperature characteristic in Section 3.159
Minimum Temperature	struct	2	Refer to Temperature characteristic in Section 3.159
Maximum Temperature	struct	2	Refer to Temperature characteristic in Section 3.159
Sensing Duration	struct	1	Refer to Time Exponential 8 characteristic in Section 3.170

Table 3.252: Structure of the Temperature Statistics characteristic

3.166 Temperature Type

3.166.1 Description

The Temperature Type characteristic is a fixed-length structure whose value consists of a single field (Temperature Text Description) containing an enumeration that indicates where the temperature was measured. These values correspond to the Temperature Type descriptions used in ISO/IEEE 11073-10408-2008.

3.166.2 Definition

The structure of this characteristic is defined below:

Field	Data Type	Size (in octets)	Requirement
Temperature Text Description	uint8	1	See Section 3.166.2.1.

Table 3.253: Structure of the Temperature Type characteristic

3.166.2.1 Temperature Text Description field

This field contains an enumeration:

Key	Description
0	Reserved for Future Use
1	Armpit
2	Body (general)
3	Ear (usually earlobe)
4	Finger
5	Gastrointestinal Tract
6	Mouth
7	Rectum
8	Toe
9	Tympanum (ear drum)
10–255	Reserved for Future Use

Table 3.254: Time Accuracy field

3.167 Three Zone Heart Rate Limits

3.167.1 Description

The Three Zone Heart Rate Limits characteristic exposes the limits between the heart rate zones for the three-zone heart rate definition (Hard, Moderate, and Light) of the current user (i.e. the user that has given consent to access the UDS Characteristics).

The Three Zone Heart Rate Limits characteristic is a member of the set of “UDS Characteristics” listed in the User Data Service Characteristics Table in the Bluetooth SIG Assigned Numbers (see the User Data Service [5]).

The Three Zone Heart Rate Limits characteristic is a fixed-length structure containing two fields.

3.167.2 Definition

The structure of this characteristic is defined below:

Field	Data Type	Size (in octets)	Description
Three Zone Heart Rate Limits - Light (Fat burn) / Moderate (Aerobic) Limit	uint8	1	Unit: org.bluetooth.unit.period.beats_per_minute
Three Zone Heart Rate Limits - Moderate (Aerobic) / Hard (Anaerobic) Limit	uint8	1	Unit: org.bluetooth.unit.period.beats_per_minute

Table 3.255: Structure of the Three Zone Heart Rate Limits characteristic

Note: The fields in the above table, reading from top to bottom, are in the order of LSO to MSO, where LSO = Least Significant Octet and MSO = Most Significant Octet.

3.168 Time Accuracy

3.168.1 Description

The Time Accuracy characteristic is used to show the accuracy (drift) of time information compared to a reference time source.

3.168.2 Definition

The structure of this characteristic is defined below:

Field	Data Type	Size (in octets)	Description
Accuracy	uint8	1	Base Unit: org.bluetooth.unit.time.second Represented values: M = 1, d = 0, b = -3 This field represents accuracy (drift) of time information in steps of 1/8 of a second (125ms) compared to a reference time source. Valid range from 0 to 253 (0s to 31.625s). If the estimated drift is larger than 31.625s, this value shall be set to 254. A value of 255 means drift is unknown.

Table 3.256: Structure of the Time Accuracy characteristic

3.169 Time Decihour 8

3.169.1 Description

The Time Decihour 8 characteristic is used to represent a period of time in tenths of an hour.

3.169.2 Definition

The structure of this characteristic is defined below:

Field	Data Type	Size (in octets)	Description
Time Decihour 8	uint8	1	Unit is hour with a resolution of 0.1. Minimum: 0.0 Maximum: 24.0 Represented values: M = 1, d = -1, b = 0 Unit: org.bluetooth.unit.time.hour A value of 0xFF represents 'value is not known'. All other values are Prohibited.

Table 3.257: Structure of the Time Decihour 8 characteristic

3.170 Time Exponential 8

3.170.1 Description

The Time Exponential 8 characteristic is used to represent a measure of period of time in seconds.

3.170.2 Definition

The structure of this characteristic is defined below:

Field	Data Type	Size (in octets)	Description
Time Exponential 8	uint8	1	The time duration is given by the value 1.1^{N-64} in seconds, with N being the raw 8-bit value. Minimum: 0.0 Maximum: 73216705 Unit: org.bluetooth.unit.time.second A raw value of 0x00 represents 0 seconds, and a raw value of 0xFF represents the total life of the device.

Table 3.258: Structure of the Time Exponential 8 characteristic

3.171 Time Hour 24

3.171.1 Description

The Time Hour 24 characteristic is used to represent a period of time in hours.

3.171.2 Definition

The structure of this characteristic is defined below:

Field	Data Type	Size (in octets)	Description
Time Hour 24	uint24	3	Unit is hour with a resolution of 1. Minimum: 0 Maximum: 16777214 Unit: org.bluetooth.unit.time.hour A value of 0xFFFFFF represents 'value is not known'.

Table 3.259: Structure of the Time Hour 24 characteristic

3.172 Time Millisecond 24

3.172.1 Description

The Time Millisecond 24 characteristic is used to represent a period of time with a resolution of 1 millisecond.

3.172.2 Definition

The structure of this characteristic is defined below:

Field	Data Type	Size (in octets)	Description
Time Millisecond 24	uint24	3	Unit is second with a resolution of 0.001. Minimum: 0 Maximum: 16777.214 Represented values: M = 1, d = -3, b = 0 Unit: org.bluetooth.unit.time.second A value of 0xFFFFFF represents 'value is not known'.

Table 3.260: Structure of the Time Millisecond 24 characteristic

3.173 Time Second 16

3.173.1 Description

The Time Second 16 characteristic is used to represent a period of time with a unit of 1 second.

3.173.2 Definition

The structure of this characteristic is defined below:

Field	Data Type	Size (in octets)	Description
Time Second 16	uint16	2	Unit is second with a resolution of 1. Minimum: 0 Maximum: 65534 Unit: org.bluetooth.unit.time.second A value of 0xFFFF represents 'value is not known'.

Table 3.261: Structure of the Time Second 16 characteristic

3.174 Time Second 8

3.174.1 Description

The Time Second 8 characteristic is used to represent a period of time with a unit of 1 second.

3.174.2 Definition

The structure of this characteristic is defined below:

Field	Data Type	Size (in octets)	Description
Time Second 8	uint8	1	Unit is second with a resolution of 1. Minimum: 0 Maximum: 254 Unit: org.bluetooth.unit.time.second A value of 0xFF represents 'value is not known'.

Table 3.262: Structure of the Time Second 8 characteristic

3.175 Time Source

3.175.1 Description

The Time Source characteristic is used to show what kind of time source is used as reference time.

3.175.2 Definition

The structure of this characteristic is defined below:

Field	Data Type	Size (in octets)	Description
Time Source	uint8	1	See Section 3.175.2.1

Table 3.263: Structure of the Time Source characteristic

3.175.2.1 Time Source field

The following values are defined for the Time Source field:

Description	Value
Unknown	0
Network Time Protocol	1
GPS	2
Radio Time Signal	3
Manual	4
Atomic Clock	5
Cellular Network	6
Reserved for Future Use	7–255

Table 3.264 Time Source field

3.176 Time Update Control Point

3.176.1 Description

The Time Update Control Point characteristic represents commands for a time server.

3.176.2 Definition

The structure of this characteristic is defined below:

Field	Data Type	Size (in octets)	Description
Time Update Control Point	uint8	1	See Section 3.176.2.1

Table 3.265: Structure of the Time Update Control Point characteristic

3.176.2.1 Time Update Control Point field

The following values are defined for the Time Update Control Point field:

Description	Value
Get Reference Update	1
Cancel Reference Update	2
Reserved for Future Use	0 and 3–255

Table 3.266: Time Update Control Point field

3.177 Time Update Status

3.177.1 Description

The Time Update Status characteristic exposes the status of the time update process and the result of the last update in a time server.

3.177.2 Definition

The structure of this characteristic is defined below:

Field	Data Type	Size (in octets)	Description
Current State	uint8	1	See Section 3.177.2.1
Result	uint8	1	See Section 3.177.2.2

Table 3.267: Structure of the Time Update Status characteristic

3.177.2.1 Current State field

The following values are defined for the Current State field:

Description	Value
Idle	0
Update Pending	1
Reserved for Future Use	2–255

Table 3.268: Current State field

3.177.2.2 Result field

The following values are defined for the Result field:

Description	Value
Successful	0

Cancelled	1
No connection to reference	2
Reference responded with an error	3
Timeout	4
Update not attempted after reset	5
Reserved for Future Use	6–255

Table 3.269: Result field

3.178 Time With DST

3.178.1 Description

The Time With DST characteristic is used to expose information about a DST change event. The Date Time characteristic in this characteristic shows the information when the DST change occurs. The DST Offset characteristic exposes the offset (how much time will be shifted from the current time).

3.178.2 Definition

The structure of this characteristic is defined below:

Field	Data Type	Size (in octets)	Description
Date Time	struct	7	Refer to Date Time characteristic in Section 3.55
DST Offset	struct	1	Refer to DST Offset characteristic in Section 3.60

Table 3.270: Structure of the Time With DST characteristic

3.179 Time Zone

3.179.1 Description

The Time Zone characteristic is used to represent the time difference in 15-minute increments between local standard time and UTC.

3.179.2 Definition

The structure of this characteristic is defined below:

Field	Data Type	Size (in octets)	Description
Time Zone	uint8	1	See Section 3.179.2.1

Table 3.271: Structure of the Time Zone characteristic

3.179.2.1 Time Zone field

This field represent the offset from UTC in number of 15-minute increments. Valid range from -48 to +56. A value of -128 means that the time zone offset is not known. All other values are reserved for future use (RFU).

The offset defined in this characteristic is constant regardless of whether daylight savings is in effect.

3.180 True Wind Direction

3.180.1 Description

The True Wind Direction characteristic is used to represent the true wind direction.

Wind direction is reported by the direction from which it originates and is an angle measured clockwise relative to Geographic North. For example, a wind coming from the north is given as 0 degrees, a wind coming from the south is given as 180 degrees, a wind coming from the east is given as 90 degrees, and a wind coming from the west is given as 270 degrees.

The True Wind Direction characteristic is a fixed-length structure containing a single True Wind Direction field.

3.180.2 Definition

The structure of this characteristic is defined below:

Field	Data Type	Size (in octets)	Description
True Wind Direction	uint16	2	Base Unit: org.bluetooth.unit.plane_angle.degree Minimum value: 0 Maximum value: 359.99 Represented values: M = 1, d = -2, b = 0 Unit is degrees with a resolution of 0.01 degrees.

Table 3.272: Structure of the True Wind Direction characteristic

3.181 True Wind Speed

3.181.1 Description

The True Wind Speed characteristic is used to represent the true wind speed.

The True Wind Speed characteristic is a fixed-length structure containing a single True Wind Speed field.

3.181.2 Definition

The structure of this characteristic is defined below:

Field	Data Type	Size (in octets)	Description
True Wind Speed	uint16	2	Base Unit: org.bluetooth.unit.velocity.metres_per_second Represented values: M = 1, d = -2, b = 0 Unit is in meters per second with a resolution of 0.01 m/s.

Table 3.273: Structure of the True Wind Speed characteristic

3.182 Two Zone Heart Rate Limits

3.182.1 Description

The Two Zone Heart Rate Limits characteristic exposes the heart rate limit between the heart rate zones for the two-zone heart rate definition (Fitness and Fat Burn) of the current user (i.e. the user that has given consent to access the UDS Characteristics).

The Two Zone Heart Rate Limits characteristic is a member of the set of “UDS Characteristics” listed in the User Data Service Characteristics Table in the Bluetooth SIG Assigned Numbers (see the User Data Service [5]).

The Two Zone Heart Rate Limits characteristic is a fixed-length structure containing one field.

3.182.2 Definition

The structure of this characteristic is defined below:

Field	Data Type	Size (in octets)	Description
Two Zone Heart Rate Limit - Fat Burn / Fitness Limit	uint8	1	Unit: org.bluetooth.unit.period.beats_per_minute

Table 3.274: Structure of the Two Zone Heart Rate Limits characteristic

3.183 Tx Power Level

3.183.1 Description

The Tx Power Level characteristic represents the current radiated transmit power level in dBm.

3.183.2 Definition

The structure of this characteristic is defined below:

Field	Data Type	Size (in octets)	Description
Tx Power	sint8	1	See Section 3.183.2.1

Table 3.275: Structure of the Tx Power Level characteristic

3.183.2.1 Power Level

Base unit: org.bluetooth.unit.logarithmic_radio_quantity.decibel [4].

Allowed range is -100 to 20.

All other values are reserved for future use.

3.184 Unread Alert Status

3.184.1 Description

This characteristic shows the number of unread alerts in the specific category in the server device.

3.184.2 Definition

The structure of this characteristic is defined below:

Field	Data Type	Size (in octets)	Description
Category ID	struct	1	Refer to Alert Category ID characteristic in Section 3.1
Unread Count	uint8	1	See Section 3.184.2.1

Table 3.276: Structure of the Unread Alert Status characteristic

3.184.2.1 Unread Count field

This field provides the number of unread alerts in the server.

The range is 0–254.
The value of 255 shall be interpreted as more than 254.

3.185 User Index

3.185.1 Description

The User Index characteristic exposes the index of the current user (i.e. the user that has given consent to access the UDS Characteristics).

The User Index characteristic is a fixed-length structure containing a single field.

3.185.2 Definition

The structure of this characteristic is defined below:

Field	Data Type	Size (in octets)	Description
User Index	uint8	1	See Section 3.185.2.1.

Table 3.277: Structure of the User Index characteristic

3.185.2.1 User Index field

The enumeration of this field is defined as follows:

Enumeration	Definition
0–254	Index of the current user.
255	The value 0xFF is reserved for “Unknown User” as defined in the User Data Service [5].

Table 3.278: User Index field

3.186 UV Index

3.186.1 Description

The UV Index characteristic is used to represent the UV Index.

The UV Index characteristic is a fixed-length structure containing a single UV Index field.

3.186.2 Definition

The structure of this characteristic is defined below:

Field	Data Type	Size (in octets)	Description
UV Index	uint8	1	Unit: org.bluetooth.unit.unitless

Table 3.279: Structure of the UV Index characteristic

3.187 VO2 Max

3.187.1 Description

The VO2 Max characteristic exposes the maximal oxygen uptake of the current user (i.e. the user that has given consent to access the UDS Characteristics).

The VO2 Max characteristic is a member of the set of “UDS Characteristics” listed in the User Data Service Characteristics Table in the Bluetooth SIG Assigned Numbers (see the User Data Service [5]).

The VO2 Max characteristic is a fixed-length structure containing a single field.

3.187.2 Definition

The structure of this characteristic is defined below:

Field	Data Type	Size (in octets)	Description
VO2 Max	uint8	1	Unit: org.bluetooth.unit.transfer_rate.milliliter_per_kilogram_per_minute

Table 3.280: Structure of the VO2 Max characteristic

3.188 VOC Concentration

3.188.1 Description

The VOC Concentration characteristic is used to represent a measure of volatile organic compounds concentration in units of parts per billion.

3.188.2 Definition

The structure of this characteristic is defined below:

Field	Data Type	Size (in octets)	Description
VOC Concentration	uint16	2	Unit is parts per billion (ppb) with a resolution of 1. Unit: org.bluetooth.unit.ppb Represented values: M = 1, d = 0, b =0 Allowed range is: 0 to 65533. A value of 0xFFFE represents ‘value is 65534 or greater’. A value of 0xFFFF represents ‘value is not known.

Table 3.281: Structure of the VOC Concentration characteristics

3.189 Voltage

3.189.1 Description

The Voltage characteristic is used to represent a measure of positive electric potential difference in units of volts.

3.189.2 Definition

The structure of this characteristic is defined below:

Field	Data Type	Size (in octets)	Description
Voltage Value	uint16	2	Unit is volt with a resolution of 1/64V. Minimum: 0.0 Maximum: 1022.0 Represented values: M = 1, d = 0, b = -6 Unit: org.bluetooth.unit.electric_potential_difference.volt A value of 0xFFFF represents 'value is not known'. The minimum representable value represents the minimum value or lower, the maximum representable value represents the maximum value or higher.

Table 3.282: Structure of the Voltage characteristic

3.190 Voltage Specification

3.190.1 Description

This characteristic aggregates three instances of the Voltage characteristic to represent a specification of voltage values.

3.190.2 Definition

The structure of this characteristic is defined below:

Field	Data Type	Size (in octets)	Description
Minimum Voltage Value	struct	2	Refer to Voltage characteristic in Section 3.188
Typical Voltage Value	struct	2	Refer to Voltage characteristic in Section 3.188
Maximum Voltage Value	struct	2	Refer to Voltage characteristic in Section 3.188

Table 3.283: Structure of the Voltage Specification characteristic

3.191 Voltage Statistics

3.191.1 Description

This characteristic aggregates four instances of the Voltage characteristic and an instance of the Time Exponential 8 characteristic to represent a set of statistical voltage values over a period of time.

3.191.2 Definition

The structure of this characteristic is defined below:

Field	Data Type	Size (in octets)	Description
Average Voltage Value	struct	2	Refer to Voltage characteristic in Section 3.188
Standard Deviation Voltage Value	struct	2	Refer to Voltage characteristic in Section 3.188
Minimum Voltage Value	struct	2	Refer to Voltage characteristic in Section 3.188
Maximum Voltage Value	struct	2	Refer to Voltage characteristic in Section 3.188
Sensing Duration	struct	1	Refer to Time Exponential 8 characteristic in Section 3.170

Table 3.284: Structure of the Voltage Statistics characteristic

3.192 Volume Flow

3.192.1 Description

The Volume Flow characteristic is used to represent a flow of a general volume such as a volume of material or gas.

3.192.2 Definition

The structure of this characteristic is defined below:

Field	Data Type	Size (in octets)	Description
Volume Flow	uint16	2	Unit is liter/second with a resolution of 0.001 (1 milliliter). Minimum: 0 Maximum: 65534 Represented values: M = 1, d = -3, b = 0 Unit: org.bluetooth.unit.volume_flow.litre_per_second A value of 0xFFFF represents 'value is not known'. All other values are Prohibited.

Table 3.285: Structure of the Volume Flow characteristic

3.193 Waist Circumference

3.193.1 Description

The Waist Circumference characteristic exposes the waist measurement of the current user (i.e. the user that has given consent to access the UDS Characteristics).

The Waist Circumference characteristic is a member of the set of "UDS Characteristics" listed in the User Data Service Characteristics Table in the Bluetooth SIG Assigned Numbers (see the User Data Service [5]). This characteristic value may be used with the Hip Circumference characteristic value to calculate the Waist-to-Hip Ratio (WHR).

The Waist Circumference characteristic is a fixed-length structure containing a single field.

3.193.2 Definition

The structure of this characteristic is defined below:

Field	Data Type	Size (in octets)	Description
Waist Circumference	uint16	2	Base Unit: org.bluetooth.unit.length.meter Represented values: M = 1, d = -2, b = 0 Unit is 0.01 meter.

Table 3.286: Structure of the Waist Circumference characteristic

3.194 Weight

3.194.1 Description

The Weight characteristic exposes the weight of the current user (i.e. the user that has given consent to access the UDS Characteristics).

The Weight characteristic is a member of the set of “UDS Characteristics” listed in the User Data Service Characteristics Table in the Bluetooth SIG Assigned Numbers (see the User Data Service [5]).

The Weight characteristic is a fixed-length structure containing a single field.

3.194.2 Definition

The structure of this characteristic is defined below:

Field	Data Type	Size (in octets)	Description
Weight	uint16	2	Base Unit: org.bluetooth.unit.mass.kilogram Represented values: M = 5, d = -3, b = 0 Unit is 0.005 kilogram.

Table 3.287: Structure of the Weight characteristic

3.195 Weight Scale Feature

3.195.1 Description

The Weight Scale Feature characteristic is used to describe the supported features of the weight scale.

The Weight Scale Feature characteristic is a fixed-length structure containing a single Weight Scale Feature field.

3.195.2 Definition

The structure of this characteristic is defined in Table 3.288.

Field	Data Type	Size (in octets)	Description
Weight Scale Feature	32-bit	4	See Section 3.195.2.1

Table 3.288: Body Composition Feature characteristic

3.195.2.1 Weight Scale Feature field

The bits of this field are defined in Table 3.289.

<table>
<tr><th>Bit Number</th><th>Definition</th></tr>
<tr><td>0</td><td>Time Stamp Supported
0 = False
1 = True</td></tr>
<tr><td>1</td><td>Multiple Users Supported
0 = False
1 = True</td></tr>
<tr><td>2</td><td>BMI Supported
0 = False
1 = True</td></tr>
<tr><td>3–6</td><td>Weight Measurement Resolution
<table>
<tr><th>Bit6</th><th>Bit5</th><th>Bit4</th><th>Bit3</th><th>Definition</th></tr>
<tr><td>0</td><td>0</td><td>0</td><td>0</td><td>Not specified</td></tr>
<tr><td>0</td><td>0</td><td>0</td><td>1</td><td>Resolution of 0.5 kg or 1 lb</td></tr>
<tr><td>0</td><td>0</td><td>1</td><td>0</td><td>Resolution of 0.2 kg or 0.5 lb</td></tr>
<tr><td>0</td><td>0</td><td>1</td><td>1</td><td>Resolution of 0.1 kg or 0.2 lb</td></tr>
<tr><td>0</td><td>1</td><td>0</td><td>0</td><td>Resolution of 0.05 kg or 0.1 lb</td></tr>
<tr><td>0</td><td>1</td><td>0</td><td>1</td><td>Resolution of 0.02 kg or 0.05 lb</td></tr>
<tr><td>0</td><td>1</td><td>1</td><td>0</td><td>Resolution of 0.01 kg or 0.02 lb</td></tr>
<tr><td>0</td><td>1</td><td>1</td><td>1</td><td>Resolution of 0.005 kg or 0.01 lb</td></tr>
<tr><td>1</td><td>X</td><td>X</td><td>X</td><td>Reserved for Future Use</td></tr>
</table></td></tr>
</table>

<table>
<tr><th>Bit Number</th><th>Definition</th></tr>
<tr><td>7–9</td><td>Height Measurement Resolution
<table>
<tr><td>Bit9</td><td>Bit8</td><td>Bit7</td><td>Definition</td></tr>
<tr><td>0</td><td>0</td><td>0</td><td>Not specified</td></tr>
<tr><td>0</td><td>0</td><td>1</td><td>Resolution of 0.01 meter or 1 inch</td></tr>
<tr><td>0</td><td>1</td><td>0</td><td>Resolution of 0.005 meter or 0.5 inch</td></tr>
<tr><td>0</td><td>1</td><td>1</td><td>Resolution of 0.001 meter or 0.1 inch</td></tr>
<tr><td>1</td><td>X</td><td>X</td><td>Reserved for Future Use</td></tr>
</table></td></tr>
<tr><td>10–31</td><td>Reserved for Future Use</td></tr>
</table>

Table 3.289: Weight Scale Feature field

3.196 Weight Scale Measurement

3.196.1 Description

The Weight Measurement characteristic is a variable-length structure containing a Flags field, Weight field, and, based upon the contents of the Flags field, additional fields shown in Table 3.290.

3.196.2 Definition

The structure of this characteristic is defined in Table 3.290.

Field	Data Type	Size (in octets)	Description
Flags	struct	1	See Section 3.196.2.1
Weight	uint16	2	This field is in kilograms with resolution 0.005 if the bit 0 of the Flag field is 0 or in pounds with a resolution of 0.01 if the bit 0 of the Flag field is 1.
Time Stamp Present if bit 1 of Flags field set to 1	struct	7	Refer to Date Time characteristic in Section 3.55
User ID Present if bit 2 of Flags field set to 1	uint8	1	The special value of 0xFF for User ID represents “unknown user”.

Field	Data Type	Size (in octets)	Description
BMI Present if bit 3 of Flags field set to 1	uint16	2	Base Unit: org.bluetooth.unit.unitless Represented values: M = 1, d = -1, b = 0
Height Present if bit 11 of Flags field set to 1	uint16		This field is in meters with a resolution of 0.001 if the bit 0 of the Flag field is 0 or in inches with a resolution of 0.1 if the bit 0 of the Flag field is 1.

Table 3.290: Weight Scale Measurement characteristic

3.196.2.1 Flags field

The values of this field are defined in Table 3.291.

Bit Number	Definition
0	Measurement Units: 0 = SI (Weight and Mass in units of kilogram (kg) and Height in units of meter) 1 = Imperial (Weight and Mass in units of pound (lb) and Height in units of inch (in))
1	Time Stamp present: 0 = False 1 = True
2	User ID present: 0 = False 1 = True
3	BMI and Height present: 0 = False 1 = True
4–7	Reserved for Future Use

Table 3.291: Flags field

3.197 Wind Chill

3.197.1 Description

The Wind Chill characteristic is used to represent the wind chill factor.

The Wind Chill characteristic is a fixed-length structure containing a single Wind Chill field.

3.197.2 Definition

The structure of this characteristic is defined below:

Field	Data Type	Size (in octets)	Description
Wind Chill	sint8	1	Unit: org.bluetooth.unit.thermodynamic_temperature.degree_celsius

Table 3.292: Structure of the Wind Chill characteristic

4 Descriptors

Descriptors are listed in alphabetical order.

All fields in a descriptors are little endian unless otherwise stated.

When referring to a descriptor UUID, the name of the descriptor is placed inside of « and » [characters]. For example, «Valid Range» references the UUID of the Valid Range descriptor.

In case a descriptor is composed of several fields, all fields are by default mandatory unless otherwise mentioned as optional or conditional.

The Data Types not explicitly defined here are defined on the assigned numbers pages [4].

4.1 Valid Range

4.1.1 Description

The Valid Range descriptor is used for defining the range of the characteristic that it describes. Two mandatory fields are contained (upper and lower bounds) which define the range.

If the Characteristic Value to which this descriptor is attached has a fixed exponent, then the values in this descriptor have the same exponent. The first value in the Valid Range descriptor represents the lower inclusive value of the range. The second value represents the higher inclusive value of the range. The data type and units for lower inclusive value and the upper inclusive value are identical to the data type and units of the characteristic for which it is used.

Example:

When used with the Measurement Interval characteristic, the Valid Range descriptor is formatted using a uint16. If the valid range has a Minimum Value of 10 minutes (600 seconds) and a Maximum Value of 2 hours (7200 seconds) the value of the Valid Range descriptor would be expressed as: 0x58 0x02 0x20 0x1C.

A characteristic that is formatted using a nibble with a fixed decimal-exponent that has a Valid Range of 2 to 13 has a Valid Range descriptor defined as: 0x02 0x0D.

A characteristic value that is formatted using a sint16 with a fixed exponent of -1 that has a Valid Range of -40 to +85 is expressed as: 0x70 0xFE 0x52 0x03.

4.1.2 Definition

The structure of this descriptor is defined in Table 4.1.

Field	Data Type	Size (in octets)	Description
Lower inclusive value	Same as characteristic it is attached to	Same as characteristic it is attached to	The lower bound is the same format as the characteristic the descriptor describes.
Upper inclusive value	Same as characteristic it is attached to	Same as characteristic it is attached to	The upper bound is the same format as the characteristic the descriptor describes.

Table 4.1: Valid Range descriptor

5 References

[1] Bluetooth Core Specification v4.0 or later

[2] IEEE Std 11073-20601™- 2008 Health Informatics - Personal Health Device Communication - Application Profile - Optimized Exchange Protocol - version 1.0 or later

[3] Continua Design Guidelines - Personal Connected Health Alliance; http://www.pchalliance.org/continua-design-guidelines

[4] Bluetooth Assigned Numbers

[5] User Data Service (UDS) v1.0 or later

[6] GS1 General Specifications; http://www.gs1.org/barcodes-epcrfid-id-keys/gs1-general-specifications