# Light Control Service

*Base UUID:     4F770000ED7D-11E4-840E-0002A5D5C51B*

*Service UUID:  0x0101*

## Abstract:

This service exposes measurement data and control methods for lights intended to use with a bicycle.

## Summary:


## Service Dependencies:

This service is not dependent upon any other service.

## GATT Requirements

| Sub-Procedure | Server Requirement |
|---|---|
| Write Characteristic Value | C1 |
| Notifications | Mandatory |
| Indications | C1 |
| Read Characteristic Descriptors | Mandatory |
| Write Characteristic Descriptors | Mandatory |

C1: Mandatory if the LC Control Point characteristic is supported, otherwise excluded for this service.

## Transport Dependencies

| Transport | Supported |
|---|---|
| Classic | false |
| Low Energy | true |
| High Speed | false |

## Error Codes

| Name | Code | Description |
|---|---|---|
|  |  |  |

# Service Characteristics

| Overview | Properties | | Security | Descriptors | | |
|---|---|---|---|---|---|---|
| **Name:**<br>Light Measurement<br>**Requirement:**<br>Mandatory | **Property** | **Requirement** | None | **Overview** | **Permissions** | |
| | Read | Optional | | **Name:**<br>Client<br>Characteristic<br>Configuration<br>**Requirement:**<br>Mandatory | **Perm.** | **Req.** |
| | Write | Excluded | | | Read | Mandatory |
| | WriteWithoutResponse | Excluded | | | Write | Mandatory |
| | SigneWrite | Excluded | | | | |
| | Notify | Mandatory | | | | |
| | Indicate | Excluded | | | | |
| | WriteableAuxiliaries | Excluded | | | | |
| | Broadcast | Excluded | | | | |
| | ExtendedProperties | | | | | |
| **Name:**<br>Light Feature<br>**Requirement:**<br>Mandatory | **Property** | **Requirement** | None | None | | |
| | Read | Mandatory | | | | |
| | Write | Excluded | | | | |
| | WriteWithoutResponse | Excluded | | | | |
| | SigneWrite | Excluded | | | | |
| | Notify | Excluded | | | | |
| | Indicate | Excluded | | | | |
| | WriteableAuxiliaries | Excluded | | | | |
| | Broadcast | Excluded | | | | |
| | ExtendedProperties | | | | | |
| **Name:**<br>Light Control Point<br>**Requirement:**<br>Optional | **Property** | **Requirement** | None | **Overview** | **Permissions** | |
| | Read | Excluded | | **Name:**<br>Client<br>Characteristic<br>Configuration<br>**Requirement:**<br>Mandatory | **Perm.** | **Req.** |
| | Write | Mandatory | | | Read | Mandatory |
| | WriteWithoutResponse | Excluded | | | Write | Mandatory |
| | SigneWrite | Excluded | | | | |
| | Notify | Excluded | | | | |
| | Indicate | Mandatory | | | | |
| | WriteableAuxiliaries | Excluded | | | | |
| | Broadcast | Excluded | | | | |
| | ExtendedProperties | | | | | |

# Light Measurement

## *Characteristic UUID:*       *0x0102*

## Summary:

The Light Measurement characteristic is a variable length structure containing a Flags field and, based on the contents of the Flags field, may contain one or more additional fields as shown in the table below.

## Value Fields

| Names | Field Req. | Format | Additional Information | | | | |
|---|---|---|---|---|---|---|---|
| Flags | Mandatory | 16bit | Bit Field | | | | |
| | | | **Bit** | **Size** | **Name** | **Definition** | |
| | | | | | | **Key** | **Value** |
| | | | 0 | 1 | Intensity Field Present | 0 | True |
| | | | | | | 1 | False |
| | | | 1 | 1 | Flood Status Field Present | 0 | True |
| | | | | | | 1 | False |
| | | | 2 | 1 | Spot Status Field Present | 0 | True |
| | | | | | | 1 | False |
| | | | 3 | 1 | Flood Output Power Field Present | 0 | True |
| | | | | | | 1 | False |
| | | | 4 | 1 | Spot Output Power Field Present | 0 | True |
| | | | | | | 1 | False |
| | | | 5 | 1 | Temperature Field Present | 0 | True |
| | | | | | | 1 | False |
| | | | 6 | 1 | Input Voltage Field Present | 0 | True |
| | | | | | | 1 | False |
| | | | 7 | 1 | Pitch Field Present | 0 | True |
| | | | | | | 1 | False |
| | | | 8 | 8 | Reserved fur future use | | |
| Mode | Mandatory | uint8 | Enumerations: | | | | |
| | | | **Key** | **Value** | | | |
| | | | 0 | Off | | | |
| | | | 1 | Flood | | | |
| | | | 2 | Spot | | | |
| | | | 3 | Flood & Spot | | | |
| | | | 4 | Flood Pitch Compensated | | | |

| | | | 5 | Spot & Pitch Compensated |
|---|---|---|---|---|
| | | | 6 | Flood & Spot Pitch Compensated |
| | | | 7 | Flood (both driver used) |
| | | | 8 | Spot (both drivers used) |
| | | | 9 | Flood Pitch Compensated (both drivers used) |
| | | | 10 | Spot Pitch Compensated (both drivers used) |
| | | | 11-255 | Reserved for future use |
| Intensity<br>**Information:**<br>Unit is is in percentage with a resolution of 1, in relation to maximum output power.<br>In an adaptive mode unit is in lux with a resolution of 1, representing the illuminance under intended use<br>**Unit:**<br>org.bluetooth.unit.percentage<br>org.bluetooth.unit.illuminance.lux<br>**Exponent:** Decimal, 0 | Optional | uint8 | None | |

**Flood Status** — Optional — 8bit — Bit Field

| Bit | Size | Name | Definition | |
|---|---|---|---|---|
| | | | **Key** | **Value** |
| 0 | 1 | Overcurrent Indicator | 0 | Not active |
| | | | 1 | active |
| 1 | 1 | Voltage Limiting Indicator | 0 | Not active |
| | | | 1 | active |
| 2 | 1 | Temperature Limiting Indicator | 0 | Not active |
| | | | 1 | active |
| 3 | 1 | Duty Cycle Limit Indicatior | 0 | Not active |
| | | | 1 | active |
| 4 | 4 | Reserved fur future use | | |

**Spot Status** — Optional — 8bit — Bit Field

| Bit | Size | Name | Definition | |
|---|---|---|---|---|
| | | | **Key** | **Value** |
| 0 | 1 | Overcurrent Indicator | 0 | Not active |
| | | | 1 | active |
| 1 | 1 | Voltage Limiting Indicator | 0 | Not active |
| | | | 1 | active |
| 2 | 1 | Temperature Limiting Indicator | 0 | Not active |
| | | | 1 | active |
| 3 | 1 | Duty Cycle Limit | 0 | Not active |

| | | | | | Indicatior | 1 | active |
|---|---|---|---|---|---|---|---|
| | | | | 4 | 4 | Reserved fur future use | |

| | | | |
|---|---|---|---|
| Flood Output Power<br>**Information:**<br>Unit is in watts with a resolution of 1/1000.<br>**Unit:**<br>org.bluetooth.unit.power.watt<br>**Exponent:** Decimal, -3 | Optional | uint16 | |
| Spot Output Power<br>**Information:**<br>Unit is in watts with a resolution of 1/1000.<br>**Unit:**<br>org.bluetooth.unit.power.watt<br>**Exponent:** Decimal, -3 | Optional | uint16 | |
| Temperature<br>**Information:**<br>Unit is in degree Celsius with a resolution of 1.<br>**Unit:**<br>org.bluetooth.unit.thermodynamic_temperature.degree_celsius<br>**Exponent:** Decimal, 0 | Optional | int8 | |
| Input Voltagge<br>**Information:**<br>Unit is in volts with a resolution of 1/1000.<br>**Unit:**<br>org.bluetooth.unit.electric_potential_difference.volt<br>**Exponent:** Decimal, -3 | Optional | uint16 | |
| Pitch<br>**Information:**<br>Unit is in degree with a resolution of 1.<br>**Unit:**<br>org.bluetooth.unit.plane_angle.degree<br>**Exponent:** Decimal, 0 | Optional | int8 | |

# Light Feature

## *Characteristic UUID:        0x0103*

## Summary:

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

## Value Fields

| Names | Field Req. | Format | Additional Information |
|---|---|---|---|
| Light Feature | Mandatory | 8bit | Bit Field |

Bit Field table (Additional Information):

| Bit | Size | Name | Definition | |
|---|---|---|---|---|
| | | | Key | Value |
| 0 | 1 | Flood Supported | 0 | True |
| | | | 1 | False |
| 1 | 1 | Spot Supported | 0 | True |
| | | | 1 | False |
| 2 | 1 | Pitch Compensation Supported | 0 | True |
| | | | 1 | False |
| 3 | 1 | Mode Change Supported | 0 | True |
| | | | 1 | False |
| 4 | 1 | Mode Configuration Supported | 0 | True |
| | | | 1 | False |
| 5 | 1 | Mode Grouping Supported | 0 | True |
| | | | 1 | False |
| 6 | 2 | Reserved fur future use | | |

# Light Control Point

## *Characteristic UUID:        0x0103*

## Summary:

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

## Value Fields

| Names | Field Req. | Format | Additional Information | | |
|---|---|---|---|---|---|
| Op Codes | Mandatory | uint8 | Enumerations | | |
| | | | **Key** | **Value** | **Description** |
| | | | 1 | Request mode Count | Request the number of modes supported by the light. The response is Op Code 0x20 followed by the mode count (in uint8). The maximum number of supported modes is 16 and has always to be a power of 2. |
| | | | 2 | Request group configuration | Request current mode grouping configuration. The response is Op Code 0x20 followed by the current number of groups (in uint8). The number of modes available in each group is the quotient of mode count and group count. |
| | | | 3 | Request mode configuration | Request a list of mode configurations. The mode list start number is sent as uint8 with preceding Op Code 0x03 operand. The response to this control point is Op Code 0x20 followed by the list as response parameter. NOTE: If the list exceeds the maximum length of the indication packet it will be truncated. To receive the complete list of modes the host has to call this procedure multiple times wirh different start values. |
| | | | 4 | Set Mode | Initiate the procedure to put the light into a specific mode. The requested mode is sent as an uint8 with preceding Op Code 0x04 operand. The response to this control point is Op Code 0x20. To put the light in off mode send an invalid mode number. |
| | | | 5 | Configure | Initiate the procedure to change |

| | | | | Mode | a set of mode configurations. The new configurations are sent as an uint8 (representing the first mode number to change) followed by a list of configurations (each containing an uint8 representing the mode and an uint8 representing the intensity) with preceding Op Code 0x05 operand. The response to this control point is Op Code 0x20 |
|---|---|---|---|---|---|
| | | | 6 | Configure Group | Initiate the procedure to change the group configuration. The new number of groups (must be a power of two) is sent as an uint8 with preceding Op Code 0x06 operand. The response to this control point is Op Code 0x20. |
| | | | 32 | Response Code | The response code is followed by the requested Op Code, the response value and optionaly the response parameter |
| | | | 0-0 | Reserved for future use | |
| | | | 5-31 | Reserved for future use | |
| | | | 33-255 | Reserved for future use | |
| Parameter Value | Optional | variable | Refer to the Op Code table above for additional information on the possible values for this filed | | |
| Request Op Code<br>**Information:**<br>The Request Op Code is a sub field of the Parameter Value for "Response Code" Op Code.<br>C1: This Field is Mandatory for "Response Code" Op Code, otherwise this field is Excluded. | C1 | uint8 | Refer to the Op Code table above for additional information on the possible values for this filed | | |

| Response Value<br>**Information:**<br>The Request Op Code is a sub field of the Parameter Value for "Response Code" Op Code.<br>C1: This Field is Mandatory for "Response Code" Op Code, otherwise this field is Excluded. | C1 | uint8 | Enumerations |
|---|---|---|---|

| Key | Value | Description |
|---|---|---|
| 1 | Success | Response for successful operation. |
| 2 | Op Code not supported | Response if unsupported Op Code is received. |
| 3 | Invalid Parameter | Response if Parameter received does not meet the requirements of the service or is outside of the supported range of the Light. |
| 4 | Operation Failed | Response if the requested procedure failed |
| 0-0 | Reserved for future use | |

| | | | 5-255 | Reserved for future use | |
|---|---|---|---|---|---|
| Response Parameter **Information:** The Response Parameter is a sub field of the Parameter Value for "Response Code" Op Code. C2:This Field is Optional for "Response Code" Op Code, otherwise this field is Excluded. | C2 | variable | Note: The Response Parameter Value of the response to the Control Point is a variable length field to allow a list of different values defined by the Service Specification | | |