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

<table>
<tr><th>Overview</th><th>Properties</th><th>Security</th><th>Descriptors</th></tr>
<tr>
<td>Name:
Light Measurement
Requirement:
Mandatory</td>
<td>
<table>
<tr><th>Property</th><th>Requirement</th></tr>
<tr><td>Read</td><td>Optional</td></tr>
<tr><td>Write</td><td>Excluded</td></tr>
<tr><td>WriteWithoutResponse</td><td>Excluded</td></tr>
<tr><td>SigneWrite</td><td>Excluded</td></tr>
<tr><td>Notify</td><td>Mandatory</td></tr>
<tr><td>Indicate</td><td>Excluded</td></tr>
<tr><td>WriteableAuxiliaries</td><td>Excluded</td></tr>
<tr><td>Broadcast</td><td>Excluded</td></tr>
<tr><td>ExtendedProperties</td><td></td></tr>
</table>
</td>
<td>None</td>
<td>
<table>
<tr><th>Overview</th><th>Permissions</th></tr>
<tr><td>Name:
Client Characteristic Configuration
Requirement:
Mandatory</td><td>
<table>
<tr><th>Perm.</th><th>Req.</th></tr>
<tr><td>Read</td><td>Mandatory</td></tr>
<tr><td>Write</td><td>Mandatory</td></tr>
</table>
</td></tr>
</table>
</td>
</tr>
<tr>
<td>Name:
Light Feature
Requirement:
Mandatory</td>
<td>
<table>
<tr><th>Property</th><th>Requirement</th></tr>
<tr><td>Read</td><td>Mandatory</td></tr>
<tr><td>Write</td><td>Excluded</td></tr>
<tr><td>WriteWithoutResponse</td><td>Excluded</td></tr>
<tr><td>SigneWrite</td><td>Excluded</td></tr>
<tr><td>Notify</td><td>Excluded</td></tr>
<tr><td>Indicate</td><td>Excluded</td></tr>
<tr><td>WriteableAuxiliaries</td><td>Excluded</td></tr>
<tr><td>Broadcast</td><td>Excluded</td></tr>
<tr><td>ExtendedProperties</td><td></td></tr>
</table>
</td>
<td>None</td>
<td>None</td>
</tr>
<tr>
<td>Name:
Light Control Point
Requirement:
Optional</td>
<td>
<table>
<tr><th>Property</th><th>Requirement</th></tr>
<tr><td>Read</td><td>Excluded</td></tr>
<tr><td>Write</td><td>Mandatory</td></tr>
<tr><td>WriteWithoutResponse</td><td>Excluded</td></tr>
<tr><td>SigneWrite</td><td>Excluded</td></tr>
<tr><td>Notify</td><td>Excluded</td></tr>
<tr><td>Indicate</td><td>Mandatory</td></tr>
<tr><td>WriteableAuxiliaries</td><td>Excluded</td></tr>
<tr><td>Broadcast</td><td>Excluded</td></tr>
<tr><td>ExtendedProperties</td><td></td></tr>
</table>
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<tr><th>Overview</th><th>Permissions</th></tr>
<tr><td>Name:
Client Characteristic Configuration
Requirement:
Mandatory</td><td>
<table>
<tr><th>Perm.</th><th>Req.</th></tr>
<tr><td>Read</td><td>Mandatory</td></tr>
<tr><td>Write</td><td>Mandatory</td></tr>
</table>
</td></tr>
</table>
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</tr>
</table>

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

<table>
<tr><th>Names</th><th>Field Req.</th><th>Format</th><th>Additional Information</th></tr>
<tr><td>Flags</td><td>Mandatory</td><td>16bit</td><td>Bit Field
<table>
<tr><th>Bit</th><th>Size</th><th>Name</th><th>Definition
<table><tr><th>Key</th><th>Value</th></tr></table></th></tr>
<tr><td>0</td><td>1</td><td>Intensity Field Present</td><td><table><tr><td>0</td><td>False</td></tr><tr><td>1</td><td>True</td></tr></table></td></tr>
<tr><td>1</td><td>1</td><td>Flood Status Field Present</td><td><table><tr><td>0</td><td>False</td></tr><tr><td>1</td><td>True</td></tr></table></td></tr>
<tr><td>2</td><td>1</td><td>Spot Status Field Present</td><td><table><tr><td>0</td><td>False</td></tr><tr><td>1</td><td>True</td></tr></table></td></tr>
<tr><td>3</td><td>1</td><td>Flood Output Power Field Present</td><td><table><tr><td>0</td><td>False</td></tr><tr><td>1</td><td>True</td></tr></table></td></tr>
<tr><td>4</td><td>1</td><td>Spot Output Power Field Present</td><td><table><tr><td>0</td><td>False</td></tr><tr><td>1</td><td>True</td></tr></table></td></tr>
<tr><td>5</td><td>1</td><td>Temperature Field Present</td><td><table><tr><td>0</td><td>False</td></tr><tr><td>1</td><td>True</td></tr></table></td></tr>
<tr><td>6</td><td>1</td><td>Input Voltage Field Present</td><td><table><tr><td>0</td><td>False</td></tr><tr><td>1</td><td>True</td></tr></table></td></tr>
<tr><td>7</td><td>1</td><td>Pitch Field Present</td><td><table><tr><td>0</td><td>False</td></tr><tr><td>1</td><td>True</td></tr></table></td></tr>
<tr><td>8</td><td>8</td><td>Reserved fur future use</td><td></td></tr>
</table></td></tr>
<tr><td>Setup</td><td>Mandatory</td><td>8bit</td><td>Bit Field
<table>
<tr><th>Bit</th><th>Size</th><th>Name</th><th>Definition
<table><tr><th>Key</th><th>Value</th></tr></table></th></tr>
<tr><td>0</td><td>1</td><td>Flood active</td><td><table><tr><td>0</td><td>False</td></tr><tr><td>1</td><td>True</td></tr></table></td></tr>
<tr><td>1</td><td>1</td><td>Spot active</td><td><table><tr><td>0</td><td>False</td></tr></table></td></tr>
</table></td></tr>
</table>

<table>
<tr><td></td><td></td><td></td><td>
<table>
<tr><td></td><td></td><td></td><td><table><tr><td>1</td><td>True</td></tr></table></td></tr>
<tr><td>2</td><td>1</td><td>Pitch compensation</td><td><table><tr><td>0</td><td>Disabled</td></tr><tr><td>1</td><td>Enabled</td></tr></table></td></tr>
<tr><td>3</td><td>1</td><td>Output cloned</td><td><table><tr><td>0</td><td>False</td></tr><tr><td>1</td><td>True</td></tr></table></td></tr>
<tr><td>4</td><td>1</td><td>External Taillight</td><td><table><tr><td>0</td><td>Disabled</td></tr><tr><td>1</td><td>Enabled</td></tr></table></td></tr>
<tr><td>5</td><td>1</td><td>External Brakelight</td><td><table><tr><td>0</td><td>Disabled</td></tr><tr><td>1</td><td>Enabled</td></tr></table></td></tr>
<tr><td>6</td><td>2</td><td>Reserved fur future use</td><td></td></tr>
</table>
</td></tr>
<tr><td>Intensity
Information:
Unit is is in percentage with a resolution of 1, in relation to maximum output power.
In a setup with activated pitch compensation the unit is in lux with a resolution of 1, representing the illuminance under intended use
Unit:
org.bluetooth.unit.percentage
org.bluetooth.unit.illuminance.lux
Exponent: Decimal, 0</td><td>Optional</td><td>uint8</td><td>Only valid if flood and/or spot are enabled.</td></tr>
<tr><td>Flood Status</td><td>Optional</td><td>8bit</td><td>Bit Field
<table>
<tr><th>Bit</th><th>Size</th><th>Name</th><th>Definition<table><tr><th>Key</th><th>Value</th></tr></table></th></tr>
<tr><td>0</td><td>1</td><td>Overcurrent Indicator</td><td><table><tr><td>0</td><td>Not active</td></tr><tr><td>1</td><td>active</td></tr></table></td></tr>
<tr><td>1</td><td>1</td><td>Voltage Limiting Indicator</td><td><table><tr><td>0</td><td>Not active</td></tr><tr><td>1</td><td>active</td></tr></table></td></tr>
<tr><td>2</td><td>1</td><td>Temperature Limiting Indicator</td><td><table><tr><td>0</td><td>Not active</td></tr><tr><td>1</td><td>active</td></tr></table></td></tr>
<tr><td>3</td><td>1</td><td>Duty Cycle Limit Indicatior</td><td><table><tr><td>0</td><td>Not active</td></tr><tr><td>1</td><td>active</td></tr></table></td></tr>
<tr><td>4</td><td>4</td><td>Reserved fur future use</td><td></td></tr>
</table>
</td></tr>
<tr><td>Spot Status</td><td>Optional</td><td>8bit</td><td>Bit Field
<table>
<tr><th>Bit</th><th>Size</th><th>Name</th><th>Definition<table><tr><th>Key</th><th>Value</th></tr></table></th></tr>
<tr><td>0</td><td>1</td><td>Overcurrent Indicator</td><td><table><tr><td>0</td><td>Not active</td></tr><tr><td>1</td><td>active</td></tr></table></td></tr>
<tr><td>1</td><td>1</td><td>Voltage Limiting</td><td><table><tr><td>0</td><td>Not active</td></tr></table></td></tr>
</table>
</td></tr>
</table>

			<table><tr><td></td><td></td><td>Indicator</td><td><table><tr><td>1</td><td>active</td></tr></table></td></tr><tr><td>2</td><td>1</td><td>Temperature Limiting Indicator</td><td><table><tr><td>0</td><td>Not active</td></tr><tr><td>1</td><td>active</td></tr></table></td></tr><tr><td>3</td><td>1</td><td>Duty Cycle Limit Indicatior</td><td><table><tr><td>0</td><td>Not active</td></tr><tr><td>1</td><td>active</td></tr></table></td></tr><tr><td>4</td><td>4</td><td>Reserved fur future use</td><td></td></tr></table>
Flood Output Power **Information:** Unit is in watts with a resolution of 1/1000. **Unit:** org.bluetooth.unit.power.watt **Exponent:** Decimal, -3	Optional	uint16	
Spot Output Power **Information:** Unit is in watts with a resolution of 1/1000. **Unit:** org.bluetooth.unit.power.watt **Exponent:** Decimal, -3	Optional	uint16	
Temperature **Information:** Unit is in degree Celsius with a resolution of 1. **Unit:** org.bluetooth.unit.thermodynamic_temperature.degree_celsius **Exponent:** Decimal, 0	Optional	int8	
Input Voltagge **Information:** Unit is in volts with a resolution of 1/1000. **Unit:** org.bluetooth.unit.electric_potential_difference.volt **Exponent:** Decimal, -3	Optional	uint16	
Pitch **Information:** Unit is in degree with a resolution of 1. **Unit:** org.bluetooth.unit.plane_angle.degree **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

<table>
<tr><th>Names</th><th>Field Req.</th><th>Format</th><th>Additional Information</th></tr>
<tr><td>Light Feature</td><td>Mandatory</td><td>16bit</td><td>Bit Field
<table>
<tr><th>Bit</th><th>Size</th><th>Name</th><th>Definition
<table>
<tr><th>Key</th><th>Value</th></tr>
</table></th></tr>
<tr><td>0</td><td>1</td><td>Flood Supported</td><td>
<table>
<tr><td>0</td><td>False</td></tr>
<tr><td>1</td><td>True</td></tr>
</table></td></tr>
<tr><td>1</td><td>1</td><td>Spot Supported</td><td>
<table>
<tr><td>0</td><td>False</td></tr>
<tr><td>1</td><td>True</td></tr>
</table></td></tr>
<tr><td>2</td><td>1</td><td>Pitch Compensation Supported</td><td>
<table>
<tr><td>0</td><td>False</td></tr>
<tr><td>1</td><td>True</td></tr>
</table></td></tr>
<tr><td>3</td><td>1</td><td>Mode Change Supported</td><td>
<table>
<tr><td>0</td><td>False</td></tr>
<tr><td>1</td><td>True</td></tr>
</table></td></tr>
<tr><td>4</td><td>1</td><td>Mode Configuration Supported</td><td>
<table>
<tr><td>0</td><td>False</td></tr>
<tr><td>1</td><td>True</td></tr>
</table></td></tr>
<tr><td>5</td><td>1</td><td>Mode Grouping Supported</td><td>
<table>
<tr><td>0</td><td>False</td></tr>
<tr><td>1</td><td>True</td></tr>
</table></td></tr>
<tr><td>6</td><td>1</td><td>LED configuration check supported</td><td>
<table>
<tr><td>0</td><td>False</td></tr>
<tr><td>1</td><td>True</td></tr>
</table></td></tr>
<tr><td>7</td><td>1</td><td>Sensor offset calibration supported</td><td>
<table>
<tr><td>0</td><td>False</td></tr>
<tr><td>1</td><td>True</td></tr>
</table></td></tr>
<tr><td>8</td><td>1</td><td>Current limitation supported</td><td>
<table>
<tr><td>0</td><td>False</td></tr>
<tr><td>1</td><td>True</td></tr>
</table></td></tr>
<tr><td>9</td><td>1</td><td>External Taillight supported</td><td>
<table>
<tr><td>0</td><td>False</td></tr>
<tr><td>1</td><td>True</td></tr>
</table></td></tr>
<tr><td>10</td><td>1</td><td>External Brake-light supported</td><td>
<table>
<tr><td>0</td><td>False</td></tr>
<tr><td>1</td><td>True</td></tr>
</table></td></tr>
<tr><td>11</td><td>1</td><td>Preferred Mode supported</td><td>
<table>
<tr><td>0</td><td>False</td></tr>
<tr><td>1</td><td>True</td></tr>
</table></td></tr>
<tr><td>12</td><td>4</td><td>Reserved fur</td><td></td></tr>
</table></td></tr>
</table>

					future use	

Light Control Point

Characteristic UUID: 0x0104

Summary:

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

Value Fields

<table>
<tr><th>Names</th><th>Field Req.</th><th>Format</th><th>Additional Information</th></tr>
<tr><td>Op Codes</td><td>Mandatory</td><td>uint8</td><td>Enumerations
<table>
<tr><th>Key</th><th>Value</th><th>Description</th></tr>
<tr><td>1</td><td>Request mode Count</td><td>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.</td></tr>
<tr><td>2</td><td>Set Mode</td><td>Initiate the procedure to put the light into a specific mode. The requested mode is sent as an uint8 with preceding Op Code 0x02 operand. The response to this control point is Op Code 0x20.
To put the light in off mode send an invalid mode number.</td></tr>
<tr><td>3</td><td>Request group configuration</td><td>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.</td></tr>
<tr><td>4</td><td>Set group configuration</td><td>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 0x04 operand. The response to this control point is Op Code 0x20.</td></tr>
<tr><td>5</td><td>Request mode configuration</td><td>Request a list of mode configurations. The mode list start number is sent as uint8 with preceding Op Code 0x05 operand. The response to this control point is Op Code 0x20 followed by the list as response parameter.
NOTE: If the list exceeds the</td></tr>
</table>
</td></tr>
</table>

		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 with different start values.
6	Set mode configuration	Initiate the procedure to change 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 setup and an uint8 representing the intensity) with preceding Op Code 0x06 operand. The response to this control point is Op Code 0x20
7	Request LED configuration	Request the LED configuration setup. The response is Op Code 0x20 followed by the number of installed LEDs of the flood driver followed by the number if LEDS if the spot driver.
8	Start LED configuration check	Initiate the procedure to start the detection of installed LED configuration. The response to this control point is Op Code 0x20 followed by the number of installed LEDs of the flood driver followed by the number if LEDS if the spot driver.
9	Request Sensor Offset	Request the current Sensor Offset Values. The response is Op Code 0x20 followed by the offset values for x, y, z axis (in int16 each). If no offset values are available yet, the response value shall be set to 0x04.
10	Start Sensor Offset Calibration	Initiate the procedure to start the sensor offset calibration. The response to this control point is 0x20 followed by the new offset values for x, y and z-axis (int16 each).
11	Request Current Limit	Request the current current limits. The response is Op Code 0x20 followed by the current limits (in int8 representing %)
12	Set Current Limit	Initiate the procedure to change the current limits. The new limits is sent as a pair of int8 (the first representing the limit for flood, the second for spot, both in %) with preceding Op Code 0x0C operand. The

<table>
<tr><td></td><td></td><td></td><td>
<table>
<tr><td></td><td></td><td>response to this control point is Op Code 0x20.</td></tr>
<tr><td>13</td><td>Request Prefered Mode</td><td>Request the currently preferred mode. The response is Op Code 0x20 followed by the preferred mode. If no preferred mode is set, the response is an invalid mode number</td></tr>
<tr><td>14</td><td>Set Prefered Mode</td><td>Initiate the procedure to set the preferred mode. The new preferred mode is sent as an uint8 with preceding Op Code 0x02 operand. The response to this control point is Op Code 0x20.
To disable the preferred mode send an invalid mode number.</td></tr>
<tr><td>32</td><td>Response Code</td><td>The response code is followed by the requested Op Code, the response value and optionaly the response parameter</td></tr>
<tr><td>0-0</td><td>Reserved for future use</td><td></td></tr>
<tr><td>9-31</td><td>Reserved for future use</td><td></td></tr>
<tr><td>33-255</td><td>Reserved for future use</td><td></td></tr>
</table>
</td></tr>
<tr><td>Parameter Value</td><td>Optional</td><td>variable</td><td>Refer to the Op Code table above for additional information on the possible values for this filed</td></tr>
<tr><td>Request Op Code
Information:
The Request Op Code is a sub field of the Parameter Value for "Response Code" Op Code.
C1: This Field is Mandatory for "Response Code" Op Code, otherwise this field is Excluded.</td><td>C1</td><td>uint8</td><td>Refer to the Op Code table above for additional information on the possible values for this filed</td></tr>
<tr><td>Response Value
Information:
The Request Op Code is a sub field of the Parameter Value for "Response Code" Op Code.
C1: This Field is Mandatory for "Response Code" Op Code, otherwise this field is Excluded.</td><td>C1</td><td>uint8</td><td>Enumerations
<table>
<tr><th>Key</th><th>Value</th><th>Description</th></tr>
<tr><td>1</td><td>Success</td><td>Response for successful operation.</td></tr>
<tr><td>2</td><td>Op Code not supported</td><td>Response if unsupported Op Code is received.</td></tr>
<tr><td>3</td><td>Invalid Parameter</td><td>Response if Parameter received does not meet the requirements of the service or is outside of the supported range of the Light.</td></tr>
<tr><td>4</td><td>Operation Failed</td><td>Response if the requested procedure failed</td></tr>
<tr><td>0-0</td><td>Reserved for future use</td><td></td></tr>
<tr><td>5-255</td><td>Reserved for future use</td><td></td></tr>
</table>
</td></tr>
</table>

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