

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: Light Measurement Requirement: Mandatory	Property	Requirement	None	Overview	Permissions	
	Read	Optional		Name: Client Characteristic Configuration Requirement: Mandatory	Perm.	Req.
	Write	Excluded			Read	Mandatory
	WriteWithoutResponse	Excluded			Write	Mandatory
	SignedWrite	Excluded				
	Notify	Mandatory				
	Indicate	Excluded				
	WriteableAuxiliaries	Excluded				
	Broadcast	Excluded				
	ExtendedProperties					
Name: Light Feature Requirement: Mandatory	Property	Requirement	None	None		
	Read	Mandatory				
	Write	Excluded				
	WriteWithoutResponse	Excluded				
	SignedWrite	Excluded				
	Notify	Excluded				
	Indicate	Excluded				
	WriteableAuxiliaries	Excluded				
	Broadcast	Excluded				
	ExtendedProperties					
Name: Light Control Point Requirement: Optional	Property	Requirement	None	Overview	Permissions	
	Read	Excluded		Name: Client Characteristic Configuration Requirement: Mandatory	Perm.	Req.
	Write	Mandatory			Read	Mandatory
	WriteWithoutResponse	Excluded			Write	Mandatory
	SignedWrite	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				
Light Type	Mandatory	8bit	Enumeration				
			Key	Value			
			0	Helmet Light			
			1	Bike Light			
			2	Tail Light			
			3-255	Reserved for future use			
Flags	Mandatory	16bit	Bit Field				
			Bit	Size	Name	Definition	
						Key	Value
			0	1	Intensity(s) Field Present	0	False
						1	True
			1	1	Flood/Main Beam Status Field Present	0	False
						1	True
			2	1	Spot/High Beam Status Field Present	0	False
						1	True
			3	1	Flood/Main Beam Output Power Field Present	0	False
						1	True
			4	1	Spot/High Beam Output Power Field Present	0	False
						1	True
			5	1	Temperature Field Present	0	False
						1	True
			6	1	Input Voltage Field Present	0	False
						1	True
			7	1	Pitch/Inclination Field Present	0	False
						1	True
			8	1	Battery SOC Present	0	False
1	True						

			9	7	Reserved fur future use		
Helmet Setup	Mandatory for Light Type “Helmet Light”, otherwise excluded	8bit	Bit Field				
			Bit	Size	Name	Definition	
						Key	Value
			0	1	Flood active	0	False
						1	True
			1	1	Spot active	0	False
						1	True
			2	1	Pitch compensation	0	Disabled
						1	Enabled
			3	1	Output cloned	0	False
1	True						
4	1	External Taillight	0	Disabled			
			1	Enabled			
5	1	External Brake-light	0	Disabled			
			1	Enabled			
6	2	Reserved fur future use					
Bike Setup	Mandatory for Light Type “Bike Light”, otherwise excluded	8bit	Bit Field				
			Bit	Size	Name	Definition	
						Key	Value
			0	1	Main Beam active	0	False
						1	True
			1	1	Extended Main Beam active	0	False
						1	True
			2	1	High Beam active	0	False
						1	True
			3	1	Daylight active	0	Disabled
1	Enabled						
4	1	External Taillight	0	Disabled			
			1	Enabled			
5	1	External Brake-light	0	Disabled			
			1	Enabled			
6	2	Reserved fur future use					
Taillight Setup	Mandatory for Light Type “Taillight”,						

	otherwise excluded																																															
Helmet Intensity Information: Unit 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 luminescence under intended use Unit: org.bluetooth.unit.percentage org.bluetooth.unit.illuminance.lux Exponent: Decimal, 0	Optional for Light Type “Helmet Light”, otherwise excluded	uint8																																														
Main Beam Intensity Information: Unit is in percentage with a resolution of 1, in relation to maximum output power. Unit: org.bluetooth.unit.percentage Exponent: Decimal, 0	Optional for Light Type “Bike Light”, otherwise excluded	uint8																																														
High Beam Intensity Information: Unit is in percentage with a resolution of 1, in relation to maximum output power. Unit: org.bluetooth.unit.percentage Exponent: Decimal, 0	Optional for Light Type “Bike Light”, otherwise excluded	uint8																																														
Flood Status	Optional for Light Type “Helmet Light”, otherwise excluded	8bit	<table><tr><th colspan="5">Bit Field</th></tr><tr><th rowspan="2">Bit</th><th rowspan="2">Size</th><th rowspan="2">Name</th><th colspan="2">Definition</th></tr><tr><th>Key</th><th>Value</th></tr><tr><td rowspan="2">0</td><td rowspan="2">1</td><td rowspan="2">Over-current Indicator</td><td>0</td><td>Not active</td></tr><tr><td>1</td><td>active</td></tr><tr><td rowspan="2">1</td><td rowspan="2">1</td><td rowspan="2">Voltage Limiting Indicator</td><td>0</td><td>Not active</td></tr><tr><td>1</td><td>active</td></tr><tr><td rowspan="2">2</td><td rowspan="2">1</td><td rowspan="2">Temperature Limiting Indicator</td><td>0</td><td>Not active</td></tr><tr><td>1</td><td>active</td></tr><tr><td rowspan="2">3</td><td rowspan="2">1</td><td rowspan="2">Duty Cycle Limit Indicator</td><td>0</td><td>Not active</td></tr><tr><td>1</td><td>active</td></tr><tr><td>4</td><td>4</td><td>Reserved fur future use</td><td colspan="2"></td></tr></table>	Bit Field					Bit	Size	Name	Definition		Key	Value	0	1	Over-current 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 Indicator	0	Not active	1	active	4	4	Reserved fur future use		
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Flood Output Power Information: Unit is in watts with a resolution of 1/1000. Unit: org.bluetooth.unit.power.watt Exponent: Decimal, -3	Optional for Light Type “Helmet Light”, otherwise excluded	uint16																																														

Main Beam Output Power Information: Unit is in watts with a resolution of 1/1000. Unit: org.bluetooth.unit.power.watt Exponent: Decimal, -3	Optional for Light Type “Bike Light”, otherwise excluded	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 for Light Type “Helmet Light”, otherwise excluded	uint16	
High Beam Output Power Information: Unit is in watts with a resolution of 1/1000. Unit: org.bluetooth.unit.power.watt Exponent: Decimal, -3	Optional for Light Type “Bike Light”, otherwise excluded	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 Voltage 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 for Light Type “Helmet Light”, otherwise excluded	int8	
Inclination Information: Unit is in degree with a resolution of 1. Unit: org.bluetooth.unit.plane_angle.degree Exponent: Decimal, 0	Optional for Light Type “Bike Light”, otherwise excluded	int8	
Battery State of Charge Information: Unit is in percentage with a resolution of 1 Unit: org.bluetooth.unit.percentage	Optional	uint8	

Exponent: Decimal, 0			
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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 Type	Mandatory	8bit	Enumeration				
			Key	Value			
			0	Helmet Light			
			1	Bike Light			
			2	Tail Light			
			3-255	Reserved for future use			
Configuration Features	Mandatory	8bit	Bit Field				
			Bit	Size	Name	Definition	
						Key	Value
			0	1	Mode Change Supported	0	False
						1	True
			1	1	Mode Configuration Supported	0	False
						1	True
			2	1	Mode Grouping Supported	0	False
						1	True
			3	1	Preferred Mode Supported	0	False
						1	True
			4	1	Temporary Mode Supported	0	False
						1	True
			5	3	Reserved for future use		
Setup Features	Mandatory	8bit	Bit Field				
			Bit	Size	Name	Definition	
						Key	Value
			0	1	LED configuration check supported	0	False
						1	True
			1	1	Sensor offset calibration supported	0	False
						1	True

			<table><tr><td rowspan="2">2</td><td rowspan="2">1</td><td rowspan="2">Current limitation supported</td><td>0</td><td>False</td></tr><tr><td>1</td><td>True</td></tr><tr><td>3</td><td>5</td><td>Reserved for future use</td><td colspan="2"></td></tr></table>	2	1	Current limitation supported	0	False	1	True	3	5	Reserved for future use																																																	
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Helmet Light Feature	Mandatory for devices of type Helmet Light, otherwise excluded	8bit	<table><tr><th colspan="5">Bit Field</th></tr><tr><th rowspan="2">Bit</th><th rowspan="2">Size</th><th rowspan="2">Name</th><th colspan="2">Definition</th></tr><tr><th>Key</th><th>Value</th></tr><tr><td rowspan="2">0</td><td rowspan="2">1</td><td rowspan="2">Flood Supported</td><td>0</td><td>False</td></tr><tr><td>1</td><td>True</td></tr><tr><td rowspan="2">1</td><td rowspan="2">1</td><td rowspan="2">Spot Supported</td><td>0</td><td>False</td></tr><tr><td>1</td><td>True</td></tr><tr><td rowspan="2">2</td><td rowspan="2">1</td><td rowspan="2">Pitch Compensation Supported</td><td>0</td><td>False</td></tr><tr><td>1</td><td>True</td></tr><tr><td rowspan="2">3</td><td rowspan="2">1</td><td rowspan="2">Driver Cloning Supported</td><td>0</td><td>False</td></tr><tr><td>1</td><td>True</td></tr><tr><td rowspan="2">4</td><td rowspan="2">1</td><td rowspan="2">External Taillight supported</td><td>0</td><td>False</td></tr><tr><td>1</td><td>True</td></tr><tr><td rowspan="2">5</td><td rowspan="2">1</td><td rowspan="2">External Brake-light supported</td><td>0</td><td>False</td></tr><tr><td>1</td><td>True</td></tr><tr><td>6</td><td>2</td><td>Reserved fur future use</td><td colspan="2">1</td></tr></table>	Bit Field					Bit	Size	Name	Definition		Key	Value	0	1	Flood Supported	0	False	1	True	1	1	Spot Supported	0	False	1	True	2	1	Pitch Compensation Supported	0	False	1	True	3	1	Driver Cloning Supported	0	False	1	True	4	1	External Taillight supported	0	False	1	True	5	1	External Brake-light supported	0	False	1	True	6	2	Reserved fur future use	1	
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Tail Light Feature	Mandatory for devices of type Tail Light, otherwise excluded	16bit	tbd.
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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

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	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 0x02 operand. The response to this control point is Op Code 0x20. To put the light in off mode send an invalid mode number.
			3	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.
			4	Set group configuration	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.
			5	Request mode configuration	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

					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, respectively two uint8 for main and high beam) 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/main beam driver followed by the number if LEDs if the spot/high beam 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/main beam driver followed by the number if LEDs if the spot/high beam 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

			<table><tr><td></td><td></td><td>for flood/main beam, the second for spot/high beam, both in %) with preceding Op Code 0x0C operand. The response to this control point is Op Code 0x20.</td></tr><tr><td>13</td><td>Request Preferred 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 Preferred 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>15</td><td>Request Temporary Mode</td><td>Request the current temporary mode. The response is Op Code 0x20 followed by the preferred mode. If no temporary mode is set, the response is an invalid mode number</td></tr><tr><td>16</td><td>Set Temporary Mode</td><td>Initiate the procedure to set the temporary mode. The new temporary 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 temporary 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 optionally the response parameter</td></tr><tr><td>0-0</td><td>Reserved for future use</td><td></td></tr><tr><td>17-31</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>			for flood/main beam, the second for spot/high beam, both in %) with preceding Op Code 0x0C operand. The response to this control point is Op Code 0x20.	13	Request Preferred Mode	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	14	Set Preferred Mode	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.	15	Request Temporary Mode	Request the current temporary mode. The response is Op Code 0x20 followed by the preferred mode. If no temporary mode is set, the response is an invalid mode number	16	Set Temporary Mode	Initiate the procedure to set the temporary mode. The new temporary 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 temporary mode send an invalid mode number.	32	Response Code	The response code is followed by the requested Op Code, the response value and optionally the response parameter	0-0	Reserved for future use		17-31	Reserved for future use		33-255	Reserved for future use	
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