Basic Scene Selector NLC Profile

***Bluetooth*® Profile Specification**

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Abstract

The Basic Scene Selector NLC Profile specifies the requirements for a product acting as a scene-selecting device in a Bluetooth mesh system.

Version History

Version Number	Date (yyyy-mm-dd)	Comments
v1.0	2023-09-12	Adopted by the Bluetooth SIG Board of Directors.
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1 Introduction

Lighting control systems support defining scenes, which act as user presets for the system states. Scenes define light levels for lighting zones (e.g., a normal scene, a room-cleaning scene, an overhead projection scene, etc.). Scenes may be recalled automatically (on schedule) or manually via user interaction.

The Basic Scene Selector NLC Profile specifies the requirements for a networked lighting control (NLC) product acting as a scene-selecting device in a Bluetooth mesh system. The Basic Scene Selector NLC Profile standardizes the use cases and implementation patterns of scene selectors to help improve interoperability and performance of systems based on Bluetooth mesh, such as networked lighting control systems.

A common use case for the Basic Scene Selector NLC Profile is a wall station device, which allows users to select and recall one or more scenes preconfigured in a lighting control system.

The Basic Scene Selector NLC Profile offers design flexibility with regards to the number of supported scenes: from single-scene selectors to multiple-scene selectors.

1.1 Change History

This section summarizes changes at a moderate level of detail and should not be considered representative of every change made.

1.1.1 Changes from v1.0 to v1.0.1

Section	Errata
3.4: Performance	25064
5: References	24815, 25369

Table 1.1: Errata incorporated in v1.0.1

1.2 Language

1.2.1 Language conventions

In the development of a specification, the Bluetooth SIG has established the following conventions for use of the terms *“shall”*, *“shall not”*, *“should”*, *“should not”*, *“may”*, *“must”*, and *“can”*. In this Bluetooth specification, the terms in Table 1.1 have the specific meanings given in that table, irrespective of other meanings that exist.

Term	Definition
shall	—used to express what is required by the specification and is to be implemented exactly as written without deviation
shall not	—used to express what is forbidden by the specification
should	—used to express what is recommended by the specification without forbidding anything
should not	—used to indicate that something is discouraged but not forbidden by the specification

Term	Definition
may	—used to indicate something that is permissible within the limits of the specification
must	—used to indicate either: 1. an indisputable statement of fact that is always true regardless of the circumstances 2. an implication or natural consequence if a separately-stated requirement is followed
can	—used to express a statement of possibility or capability

Table 1.2: Language conventions terms and definitions

1.2.1.1 Implementation alternatives

When specification content indicates that there are multiple alternatives to satisfy specification requirements, if one alternative is explained or illustrated in an example it is not intended to limit other alternatives that the specification requirements permit.

1.2.1.2 Discrepancies

It is the goal of Bluetooth SIG that specifications are clear, unambiguous, and do not contain discrepancies. However, members can report any perceived discrepancy by filing an erratum and can request a test case waiver as appropriate.

1.2.2 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.

1.2.3 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.

1.3 Table requirements

Requirements in this specification are defined as "Mandatory" (M), "Optional" (O), "Excluded" (X), “Not Applicable” (N/A), or "Conditional" (C.n). Conditional statements (C.n) are listed directly below the table in which they appear.

1.4 Conformance

Each capability of this specification shall be supported in the specified manner. This specification may provide options for design flexibility, because, for example, some products do not implement every portion of the specification. For each implementation option that is supported, it shall be supported as specified.

2 Configuration

2.1 Identification

The Basic Scene Selector NLC Profile shall be identified by the «Basic Scene Selector» mesh profile UUID (see [3]) in Composition Data Page 2 (see [1]).

2.2 NLC profile relationships

A device implementing the Basic Scene Selector NLC Profile interacts with devices implementing the Basic Lightness Controller NLC Profile [4] as defined in Mesh Model [2] Section 6.5.1.3, “Scene Store and Scene Recall behavior”, and shown in Figure 2.1.

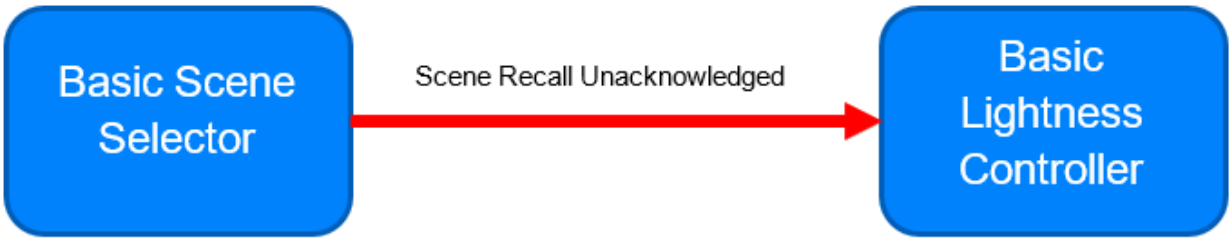

Figure 2.1: Interaction of a Basic Scene Selector with a Basic Lightness Controller

2.3 Concurrency limitations and restrictions

There are no concurrency limitations or restrictions imposed by this specification.

2.4 Topology limitations and restrictions

There are no topology limitations or restrictions imposed by this specification.

2.5 Bluetooth specification release compatibility

This specification is compatible with Mesh Protocol Version 1.1 [1] and Mesh Model Version 1.1 [2].

2.6 Mesh Protocol dependencies

This specification requires implementation of all mandatory requirements for an unprovisioned device and a node described in the Mesh Protocol specification [1].

3 Requirements and recommendations

The Basic Scene Selector NLC Profile specifies the following requirements and recommendations.

3.1 Provisioning

The following requirements are related to provisioning:

- The PB-GATT provisioning bearer shall be supported. See Section 5.2.2 in [1].
- Either the device «Complete Local Name» advertising data (AD) type or the device «Shortened Local Name» AD type shall be included in scan response data when advertising the Mesh Provisioning Service. See Section 7.1.2.2.1 in [1].
- Visual attention indication for all instances of the Attention Timer shall be supported. The visual attention indication may be shared among multiple instances of the Attention Timer. See Section 4.2.10 in [1].

3.2 Bearers

The following requirements are related to bearers:

- The advertising bearer shall be supported. See Section 3.3.1 in [1].
- The Generic Attribute Profile (GATT) bearer shall be supported in the GATT Bearer Server role. See Section 3.3.2 in [1].

3.3 Features

The following requirements are related to features:

- The Relay feature shall be supported. See Section 3.4.6.1 in [1].
- The Proxy feature shall be supported. See Section 3.4.6.2 in [1].

3.4 Performance

The following requirements are related to performance:

- At least two network keys shall be supported. See Section 3.9.6.3 in [1].
- At least three application keys shall be supported. See Section 3.9.6.2 in [1].
- At least three application keys shall be supported by the Model to AppKey List state for each model instance that uses application keys. See Section 4.2.7 in [1].
- At least 32 entries in the replay protection list shall be supported. See Section 4.2.2.1 in [1].
- At least 8 entries per connection in the proxy filter list shall be supported. See Section 6.4 in [1].
- At least 64 entries in the network message cache shall be supported. See Section 3.4.6.5 in [1].

3.5 Models

The following requirements are related to models:

- The Scene Client model shall be supported. See Section 5.4.2 in [2].

- The Scene Client model shall support publication of Scene Recall Unacknowledged messages with the Scene Number field set to each value in the range from 1 to N, where N shall be greater than 0 and N shall represent the total number of supported scenes by the device implementing the Basic Scene Selector NLC Profile. See Section 5.4.2.2.5 in [2].
- The total number of supported scenes shall be included in Device Composition Data Page 2 in the Additional_Data field of the Mesh_Profile_Entry corresponding to the Basic Scene Selector NLC Profile, as defined in Table 3.1.

Field	Size (octets)	Description
Number_Of_Scenes	2	Total number of scenes supported

Table 3.1: Format for the Additional_Data field (see section 4.2.2.6 in [1])

3.6 Combinations of NLC profiles

The following requirements are related to combinations of the Basic Scene Selector NLC Profile and combinations with other NLC profiles (see [3]):

- When multiple instances of the Basic Scene Selector NLC Profile are combined on a device, the number of entries in the replay protection list on the device shall be at least the number of entries in the replay protection list required by the Basic Scene Selector NLC Profile. See Section 4.2.2.1 in [1].
- When the Basic Scene Selector NLC Profile is combined with other NLC profiles on a device, the number of entries in the replay protection list on the device shall be at least the highest required minimum number of entries among the NLC profiles. See Section 4.2.2.1 in [1].
- When multiple instances of the Basic Scene Selector NLC Profile are combined on a device, the device shall support at least the minimum number of network keys defined for the Basic Scene Selector NLC Profile. See Section 3.9.6.3 in [1].
- When the Basic Scene Selector NLC Profile is combined with other NLC profiles on a device, the device shall support at least the highest minimum number of network keys defined among the NLC profiles. See Section 3.9.6.3 in [1].
- When multiple instances of the Basic Scene Selector NLC Profile are combined on a device, the device shall support at least the minimum number of application keys defined for the Basic Scene Selector NLC Profile. See Section 3.9.6.2 in [1].
- When the Basic Scene Selector NLC Profile is combined with other NLC profiles on a device, the device shall support at least the highest minimum number of application keys defined among the NLC profiles. See Section 3.9.6.2 in [1].

3.7 Recommendations

Implementers should consider the following recommendations:

- If a blinking sequence on power-up in the unprovisioned state is supported, then it should be the Unprovisioned Blinking Sequence defined by the DiiA Part 341 specification [6].
- If a reset to factory default settings is supported, then a manual reset (i.e., physical interaction with the device) should be supported.
- When sending the Scene Client model messages, the Delay field should be used to support synchronous operation of luminaires. See Section 5.4.2.2.5 in [2] and Section 3.4 in [5].

4 Acronyms and abbreviations

Acronym/Abbreviation	Meaning
AD	advertising data
GATT	Generic Attribute Profile
NLC	networked lighting control
PDU	Protocol Data Unit
RFU	Reserved for Future Use

Table 4.1: Acronyms and abbreviations

5 References

[1] Mesh Protocol Specification, Version 1.1 or later

[2] Mesh Model Specification, Version 1.1 or later

[3] Bluetooth SIG Assigned Numbers, https://www.bluetooth.com/specifications/assigned-numbers

[4] Basic Lightness Controller NLC Profile, Version 1.0 or later

[5] Building a Sensor-Driven Lighting Control System Based on Bluetooth Mesh – Bluetooth White Paper, Version 1.0

[6] Digital Illumination Interface Alliance (DiiA), “Part 341 – Bluetooth Mesh to DALI Gateway”, https://www.dali-alliance.org/specifications/download.html