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## SCAN PARAMETERS PROFILE SPECIFICATION

### Abstract

This profile defines how a Scan Client device with *Bluetooth* low energy wireless communications can write its scanning behavior to a Scan Server, and how a Scan Server can request updates of a Scan Client scanning behavior.

## Revision History

| Revision | Date       | Comments  |
|----------|------------|---|
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*Scan Parameters Profile Specification*

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## Document Terminology

The Bluetooth SIG has adopted Section 13.1 of the IEEE Standards Style Manual, which dictates use of the words “shall”, “should”, “may”, and “can” in the development of documentation, as follows:

The word *shall* is used to indicate mandatory requirements strictly to be followed in order to conform to the standard and from which no deviation is permitted (*shall* equals *is required to*).

The use of the word *must* is deprecated and shall not be used when stating mandatory requirements; *must* is used only to describe unavoidable situations.

The use of the word *will* is deprecated and shall not be used when stating mandatory requirements; *will* is only used in statements of fact.

The word *should* is used to indicate that among several possibilities one is recommended as particularly suitable, without mentioning or excluding others; or that a certain course of action is preferred but not necessarily required; or that (in the negative form) a certain course of action is deprecated but not prohibited (*should* equals *is recommended that*).

The word *may* is used to indicate a course of action permissible within the limits of the standard (*may* equals *is permitted*).

The word *can* is used for statements of possibility and capability, whether material, physical, or causal (*can* equals *is able to*).

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# 1 Introduction

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The Scan Parameters Profile is used to provide devices with information to assist them in managing their connection idle timeout and advertising parameters to optimize for power consumption and/or reconnection latency.

This profile shall operate over an LE transport only.

## 1.1 Profile Dependencies

This profile requires the Generic Attribute Profile (GATT).

This specification can be used with *Bluetooth* Core Specification version 4.0 [\[1\]](#) or later.

## 1.2 Conformance

If conformance to this profile is claimed, all capabilities indicated as mandatory for this profile shall be supported in the specified manner (process-mandatory). This also applies for all optional and conditional capabilities for which support is indicated. All mandatory capabilities, and optional and conditional capabilities for which support is indicated, are subject to verification as part of the *Bluetooth* qualification program.

## 2 Configuration

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### 2.1 Roles

This profile defines two roles: Scan Client and Scan Server.

- The Scan Server shall be a GATT server.
- The Scan Client shall be a GATT client.

### 2.2 Role/Service Relationships

Figure 2.1 shows the relationship between services and the two profile roles.

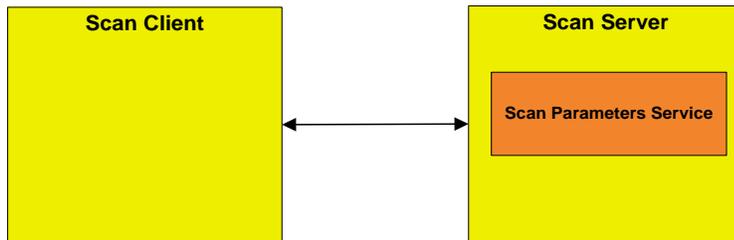


Figure 2.1: Role/Service Relationships

Note: Profile roles are represented by yellow boxes and services are represented by orange boxes.

The Scan Server has a single instance of the Scan Parameters Service [2].

### 2.3 Concurrent Role Limitations and Restrictions

There are no concurrency limitations or restrictions for the Scan Server and Scan Client roles imposed by this profile.

### 2.4 Topology Limitations and Restrictions

The Scan Server shall use the GAP Peripheral role.

The Scan Client shall use the GAP Central role.

### 2.5 Multiple Service Instances

Multiple service instances shall not be supported for the Scan Parameters Service.

### **3 Scan Server Requirements**

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This profile does not impose any additional requirements on a Scan Server beyond those defined in the Scan Parameters Service specification.

## 4 Scan Client Requirements and Behaviors

This section describes the procedure and characteristic support requirements for a Scan Client.

| Procedure  | Ref.    | Requirement |
|--|---------|-------------|
| Service Discovery  | 4.2     | M           |
| <ul style="list-style-type: none"> <li>Scan Parameters Service Discovery</li> </ul>                | 4.2.1   | M           |
| Characteristic Discovery   | 4.3     | M           |
| <ul style="list-style-type: none"> <li>Scan Parameters Service Characteristic Discovery</li> </ul> | 4.3.1   | M           |
| Scan Interval Window   | 4.3.1.1 | M           |
| Scan Refresh   | 4.3.1.2 | M           |

Table 4.1: Scan Client Requirements

### 4.1 GATT Sub-Procedure Requirements

Requirements in this section represent a minimum set of requirements for a Scan Client. Other GATT sub-procedures may be used if supported by both GATT Client and Server.

Table 4.2 summarizes *additional* GATT sub-procedure requirements beyond those required by all GATT Clients.

| GATT Sub-Procedure   | Requirement |
|--|-------------|
| Discover All Primary Services                                  | C.1         |
| Discover Primary Services by Service UUID                      | C.1         |
| Discover All Characteristics of a Service                      | C.2         |
| Discover Characteristics by UUID                               | C.2         |
| Discover All Characteristic Descriptors                        | M           |
| Write Without Response   | M           |
| Notifications  | M           |
| C1: Mandatory to support at least one of these sub-procedures. |             |
| C2: Mandatory to support at least one of these sub-procedures. |             |

Table 4.2: Additional GATT Sub-Procedure Requirements

### 4.2 Service Discovery

The Scan Client shall perform primary service discovery using either the GATT *Discover All Primary Services* sub-procedure or the GATT *Discover Primary Services by Service UUID* sub-procedure.

#### 4.2.1 Scan Parameters Service Discovery

The Scan Client shall perform primary service discovery to discover the Scan Parameters Service.

### 4.3 Characteristic Discovery

#### 4.3.1 Scan Parameters Service Characteristic Discovery

The Scan Client shall use either the *GATT Discover All Characteristics of a Service* sub-procedure or the *GATT Discover Characteristics by UUID* sub-procedure to discover all characteristics of the service.

##### 4.3.1.1 Scan Interval Window Characteristic

The Scan Client shall discover the Scan Interval Window characteristic.

##### 4.3.1.2 Scan Refresh Characteristic

The Scan Client shall discover if the Scan Refresh characteristic is present on the Scan Server.

The Scan Client shall discover the associated *Client Characteristic Configuration Descriptor* of the Scan Refresh characteristic if the Scan Refresh characteristic is present on the Scan Server.

### 4.4 Scan Interval Window Behavior

The *Scan Interval Window* characteristic is written to the Scan Server and holds the scan parameters of the Scan Client as shown in [Table 4.3](#):

| Parameter        | Description  | Default Value                       |
|------------------|--|-------------------------------------|
| LE_Scan_Interval | Maximum Scan Interval the Scan Client intends to use while scanning.   | Recommended by higher-layer profile |
| LE_Scan_Window   | Minimum Scan Window the Scan Client intends to use while scanning in conjunction with the maximum Scan Interval written. | Recommended by higher-layer profile |

Table 4.3: Scan Interval Window characteristic value

The Scan Client shall write the latest intended scan parameters to the Scan Interval Window characteristic in the situations shown below in [Table 4.4](#):

| Event  | Comments   |
|--|--|
| Connection establishment to non-bonded Scan Server                     |  |
| Scan Client's intended scanning behavior changes                       |  |
| Connection establishment to bonded Scan Server                         | Only if Scan Refresh characteristic does not exist on Scan Server. |
| Scan Client receives notification of Scan Refresh characteristic value |  |

Table 4.4: Scan Client behavior matrix

It is the responsibility of the Scan Client to attempt to maintain the scanning behavior defined after the Scan Interval Window characteristic is written to a Scan Server when the Scan Server is disconnected.

## 4.5 Scan Refresh Behavior

The Scan Refresh characteristic is used to inform the Scan Client that the Scan Server requires the most recent settings the Scan Client intends to use for its scanning behavior, when disconnected from that Scan Server, to be written to the Scan Interval Window characteristic.

Note: Support of the Scan Refresh characteristic allows a Scan Server able to store the Scan Client scanning parameters in non-volatile memory to minimize writes to the Scan Interval Window characteristic to events defined in [Table 4.4](#).

If connected to a bonded Scan Server, the Scan Client shall enable notifications of the Scan Refresh characteristic using the *Client Characteristic Configuration* descriptor.

If a Scan Client discovers the Scan Refresh characteristic on a Scan Server then, after an initial write to the Scan Interval Window characteristic following connection establishment as defined in [Table 4.4](#), it shall only write again to the Scan Interval Window characteristic after receiving a notification of the Scan Refresh characteristic value from the Scan Server, or if the Scan Client changes its intended scanning behavior.

## **5 Connection Establishment**

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Connection establishment procedures used by a Scan Client and Scan Server are defined by a higher-layer profile.

## **6 Security Requirements**

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Security Requirements for a Scan Client and Scan Server are defined by a higher-layer profile.

## **7 List of Figures**

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## 9 Acronyms and Abbreviations

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| <b>Acronyms and Abbreviations</b> | <b>Meaning</b>                |
|-----------------------------------|-------------------------------|
| GAP                               | Generic Access Profile        |
| GATT                              | Generic Attribute Profile     |
| LE                                | Low Energy                    |
| UUID                              | Universally Unique Identifier |

*Table 9.1: Acronyms and Abbreviations*

## 10 References

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- [1] *Bluetooth* Core Specification version 4.0 and later
- [2] Scan Parameters Service v1.0 and later
- [3] Characteristic and Descriptor descriptions are accessible via the [Bluetooth SIG Assigned Numbers](#).