Weight Scale Profile

Bluetooth® **Profile Specification**

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Abstract:

This *Bluetooth*® profile enables a Collector device to connect and interact with a Weight Scale intended for consumer healthcare and sports/fitness applications.

Revision History

Revision	Date (yyyy-mm-dd)	Comments
V1.0.0	2014-10-21	Adopted by the Bluetooth SIG BoD
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Document Terminology

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*).

The term *Reserved for Future Use (RFU)* is used to indicate Bluetooth SIG assigned values that are reserved by the Bluetooth SIG and are not otherwise available for use by implementations.

Contents

1 Introduction

The Weight Scale Profile is used to enable a data collection device to obtain data from a Weight Scale that exposes the Weight Scale Service [1].

1.1 Profile Dependencies

This profile requires the Generic Attribute Profile (GATT).

1.2 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.

1.3 Bluetooth Specification Release Compatibility

This specification is compatible with Bluetooth Core Specification 4.2 or later [2].

2 Configuration

2.1 Roles

The profile defines two roles: Weight Scale and Collector.

The Weight Scale is the device that reports weight-related data to a Collector. The Collector is the device that receives the data from a Weight Scale.

- The Weight Scale shall be a GATT Server and may also be a GATT Client.

- The Collector shall be a GATT Client and may also be a GATT Server.

2.2 Role/Service Relationships

The following diagram shows the relationships between service and profile roles.
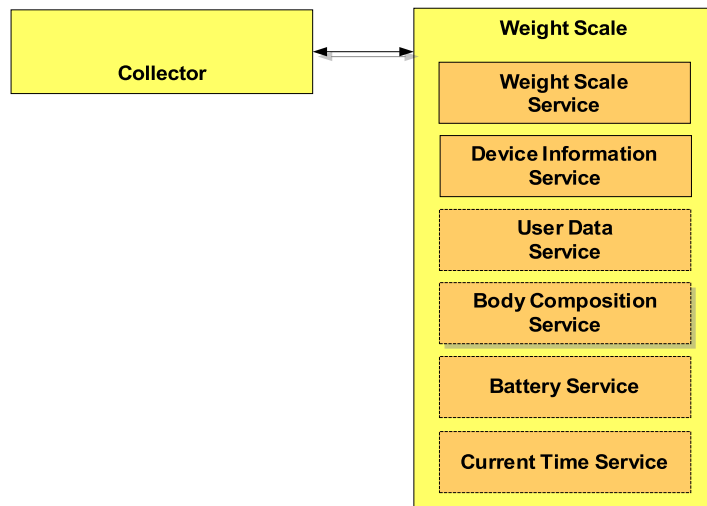
Notes: Profile roles (Collector, Weight Scale) are represented by yellow boxes and services (Weight Scale Service, Device Information Service, Body Composition Service, User Data Service, Battery Service and Current Time Service) are represented by orange boxes.

Items in dashed boxes are optional or conditional.

A Weight Scale instantiates the Weight Scale Service [1] and Device Information Service [6], and optionally the Body Composition Service [4], User Data Service [5], Battery Service [7], and Current Time Service [8].

2.3 Concurrency Limitations and Restrictions

There are no concurrency limitations or restrictions for the Collector and Weight Scale imposed by this profile.

2.4 Topology Limitations and Restrictions

2.4.1 Topology Restrictions for Low Energy

This section describes topology limitations and restrictions when the profile is used over Low Energy transport.

The Weight Scale shall use the GAP Peripheral role.

The Collector shall use the GAP Central role.

2.4.2 Topology Limitations and Restrictions for BR/EDR

There are no topology limitations or restrictions when the profile is used over the BR/EDR transport.

2.5 Transport Dependencies

There are no transport restrictions imposed by this profile specification.

Where the term BR/EDR is used in this document, it also includes the optional use of AMP.

3 Weight Scale Role Requirements

The Weight Scale shall instantiate one and only one Weight Scale Service [1]. See specific recommendations in Section 3.2.

The Weight Scale Service shall be instantiated as a «Primary Service».

The Weight Scale shall instantiate the Device Information Service [6]. See additional requirements in Section 3.4.

The Body Composition Service [4], if supported, shall be instantiated as a «Secondary Service» and shall be included in the Weight Scale Service definition. See additional requirements in Section 3.3.

The User Data Service [5], if supported, shall be instantiated as a «Primary Service». See additional requirements in Section 3.5.

The Weight Scale should instantiate the Battery Service [7].

The Weight Scale should instantiate the Current Time Service [8].

Service	Weight Scale
Weight Scale Service	M
Device Information Service	M
Body Composition Service	O
User Data Service	C.1
Battery Service	O
Current Time Service	C.2

Table 3.1: Weight Scale Service Requirements.

C.1:   Mandatory if the Weight Scale supports multiple users, otherwise optional.

C.2:   Optional, but recommended for implementations requiring compliance with IEEE 11073-20601.

Other than the Weight Scale requirements in this section, refer to Sections 5.1 and 6.1 for additional Weight Scale requirements for the LE Transport and Sections 5.3 and 6.3 for the BR/EDR transport.

3.1 Additional Requirements for Low Energy Transport

This section describes additional Weight Scale requirements beyond those defined in the Weight Scale Service [1] when using this profile over Low Energy transport.

3.1.1 Service UUIDs AD Type

While in a GAP Discoverable Mode for initial connection to a Collector, the Weight Scale should include the Weight Scale Service UUID defined in [3] in the Service UUIDs AD type field of the advertising data. This enhances the user experience since a Weight Scale may be identified by the Collector before initiating a connection.

3.1.2   Local Name AD Type

For enhanced user experience, a Weight Scale should include the Local Name (containing either the complete or shortened value of the Device Name characteristic as defined in [2]) in its Advertising Data or Scan Response Data. For privacy reasons, Weight Scales with the Privacy Feature enabled should not include this field in the advertisement.

3.1.3   Writable GAP Device Name Characteristic

The Weight Scale may support the write property for the Device Name characteristic in order to allow a Collector to write a device name to the Weight Scale.

3.1.4   Appearance AD Type

For enhanced user experience, a Weight Scale should include the value of the Appearance characteristic defined in [3] in its Advertising data or Scan Response data.

3.1.5   Service Data AD Type

For reduced power consumption, a Weight Scale that supports multiple users should support the Service Data AD Type.

When the Weight Scale is using Undirected Advertising, it should include the Service Data AD Type in its Advertising Data to reduce unwanted connection requests by unintended Collectors. Conversely, if the Weight Scale is using any form of Directed Advertising (e.g., Low Duty Cycle Directed Advertising), this feature is not needed.

The definition of the Service Data payload is shown in Table 3.2, and includes the User ID List field that contains a list of one or more User IDs for which the Weight Scale has new measurements.

The Collector can read the User ID List value to determine whether or not the Weight Scale has any pending indications since the last time they connected to avoid unnecessary connection requests. See Section 5.1.4 and 5.2.2 for additional requirements. In other words, this can be used by the Collector to determine whether it should attempt to reconnect to the Weight Scale to receive indications that may be pending.

Service UUID	User ID List
«Weight Scale»	List of one-octet User ID values

Table 3.2: Service Data AD Type for use with the Weight Scale Profile

3.2   Incremental Weight Scale Service Requirements

This section describes additional requirements beyond those defined in the Weight Scale Service.

The Weight Scale shall send indications of the Weight Measurement characteristic to the designated Collector. However, if the Weight Scale supports the User Data Service, see additional requirements related to the sending of indications in Section 3.5. Refer to Section 4.11 for Collector requirements in order to access the measurement data. Since the Weight Scale Service was designed to only send data to a single Client for a given user, the Weight Scale shall only send indications to the last bonded Collector per user.

If the Body Composition Service is supported by the Weight Scale, then the Height and BMI fields shall be included in the Weight Measurement characteristic.

For implementations that support the User Data Service, the User Index value shall be the same as the User ID value for a given user.

3.2.1 Time Stamp of Weight Measurement Characteristic

If the Current Time Service is exposed, the value of the Date Time field within the Current Time characteristic may be updated by the Collector writing to the characteristic. If the Time Stamp feature is supported by the Weight Scale Service, the value of the Time Stamp field of the Weight Measurement characteristic shall be the same as the value of the Date Time field within the Current Time characteristic at the time of measurement.

3.3 Incremental Body Composition Service Requirements

This section describes additional requirements beyond those defined in the Body Composition Service.

The Weight Scale shall send indications of the Body Composition Measurement characteristic only to the designated Collector. However, if the Weight Scale supports the User Data Service, see additional requirements related to the sending of indications in Section 3.5. Refer to Section 4.11 for Collector requirements in order to access the measurement data. Since the Body Composition Service was designed to send data only to a single Client for a given user, the Weight Scale shall only send indications to the last bonded Collector per user.

If the Body Composition Service is supported by the Weight Scale, the Height and Weight fields shall not be present in the Body Composition Measurement characteristic. This is to avoid duplication of data that will also be present in the Weight Measurement characteristic of the Weight Scale Service.

If the Body Composition Service is supported by the Weight Scale, support for the Time Stamp feature and the Multiple Users feature shall be the same as in the Weight Scale Service (i.e., if the Time Stamp feature and Multiple Users feature are supported by the Weight Scale Service, they shall also be supported by the Body Composition Service).

For implementations that support the User Data Service, the User Index value shall be the same as the User ID value for a given user.

3.3.1 Time Stamp of Body Composition Measurement Characteristic

If the Current Time Service is exposed, the value of the Date Time field within the Current Time characteristic may be updated by the Collector writing to the characteristic. If the Time Stamp feature is supported by the Body Composition Service, the value of the Time Stamp field within the Body Composition Measurement characteristic shall be the same as the value of the Date Time field of the Current Time characteristic at the time of measurement.

3.4 Incremental Device Information Service Requirements

This section describes additional requirements beyond those defined in the Device Information Service [6].

Device Information Service Characteristic	Requirement
Manufacturer Name String	M
Model Number String	M
System ID	C.1

Table 3.3: Device Information Service Requirements

C.1:   System ID is mandatory for implementations requiring compliance with IEEE 11073-20601, otherwise optional.

Characteristics in this service may be transcoded by the Collector for use in an ISO/IEEE 11073 ecosystem. See the Personal Health Devices Transcoding White Paper [9] for more information. Since strings in this service are encoded as UTF-8, and ISO/IEEE 11073-20601a [10] specifies that strings are encoded as ASCII printable characters (a subset of UTF-8), characters used in string characteristics that are to be transcoded for use in an ISO/IEEE 11073 ecosystem must be restricted to the printable ASCII character set in order to ensure that the strings can be correctly displayed.

If the ISO/IEEE 11073-20601 specification is updated in the future to include UTF-8 support, implementers should consider the impact of using non-ASCII characters on backward compatibility.

Note: The Personal Health Devices Transcoding White Paper [9] recommends that characters outside of the printable ASCII range be translated to characters inside of the printable ASCII range as appropriate.

3.5 Incremental User Data Service Requirements

This section describes additional requirements beyond those defined in the User Data Service.

The User Index value shall be the same as the User ID value for both the Weight Measurement characteristic and the Body Composition measurement characteristic for a given user. The User ID value is assigned by the Weight Scale when a new user is created and the User Index value is sent to the Collector when the Register New User procedure is initiated.

The Weight Scale shall maintain the value of the Database Change Increment characteristic separately for each supported User Index.

For Weight Scales that support multiple users, Weight Measurement indications and Body Composition Measurement indications shall not be sent unless the user has given consent via UDS for specified user (i.e., only for the user corresponding to the User Index value). If user data is deleted (i.e., using the Delete User Data procedure), only data corresponding to the User Index value shall be deleted.

Table 3.4 shows additional requirements beyond those defined in the User Data Service [5].

User Data Service Characteristic	Requirement
Weight	Not used with this profile, but may be present (e.g., if used by another profile).
Age	Recommended
Date of Birth	Recommended
First Name	Recommended
Height	Recommended
Gender	Recommended

Table 3.4: User Data Service Requirements

If the Date of Birth characteristic exists in the User Data Service, a value of 0 for Year shall not be used, but a value of 0 for Month and Day may be used for privacy reasons.

4 Collector Role Requirements

The Collector shall support the Weight Scale Service [1] and the User Data Service [5]. The Collector should use the Body Composition Service [4], Device Information Service [6] as well as the Battery Service [7], and the Current Time Service [8].

Service	Collector
Weight Scale Service	M
User Data Service	M
Body Composition Service	O
Device Information Service	O
Battery Service	O
Current Time Service	O

Table 4.1: Collector Service Requirements

This section describes the profile requirements for a Collector.

Profile Requirement	Section	Support in Collector
Service Discovery	--	--
Weight Scale Service Discovery	4.2	M
Body Composition Service Discovery	4.2	C.1
User Data Service Discovery	4.2	M
Device Information Service Discovery	4.2	C.2
Battery Service Discovery	4.2	C.3
Current Time Service Discovery	4.2	C.4
Characteristic Discovery	--	--
Weight Scale Service Characteristic Discovery	4.3.1	M
Body Composition Service Characteristic Discovery	4.3.2	C.1
User Data Service Characteristic Discovery	4.3.3	M
Device Information Service Characteristic Discovery	4.3.4	C.2
Battery Service Characteristic Discovery	4.3.5	C.3
Current Time Service Characteristic Discovery	4.3.6	C.4

Profile Requirement	Section	Support in Collector
Weight Scale Service Characteristic Support	--	--
Weight Scale Feature	4.4.1	M
Weight Measurement	4.4.2	M
Body Composition Service Characteristic Support	--	--
Body Composition Feature	4.5.1	C.1
Body Composition Measurement	4.5.2	C.1
User Data Service Characteristic Support	--	--
User Index	4.6.1	M
Database Change Increment	4.6.2	C.5
User Control Point	4.6.3	M
Other User Data Service characteristics	4.6.4	O

Table 4.2: Profile Requirements for Collector

C.1:   Mandatory if the Body Composition Service is supported, otherwise not specified.

C.2:   Mandatory if the Device Information Service is supported, otherwise not specified.

C.3:   Mandatory if the Battery Service is supported, otherwise not specified.

C.4:   Mandatory if the Current Time Service is supported, otherwise not specified.

C.5:   Mandatory if writing to UDS Characteristics is supported, otherwise optional.

4.1 GATT Sub-Procedure Requirements

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

The table below summarizes *additional* GATT sub-procedure requirements beyond those required by all GATT Clients.

GATT Sub-Procedure	Collector Requirements
Discover All Primary Services	C.1
Discover Primary Services by Service UUID	C.1
Find Included Services	C.2
Discover All Characteristics of a Service	C.3
Discover Characteristics by UUID	C.3

GATT Sub-Procedure	Collector Requirements
Discover All Characteristic Descriptors	M
Read Characteristic Value	M
Read Long Characteristic Values	C.4
Write Characteristic Value	C.5
Write Long Characteristic Values	C.6
Read Characteristic Descriptors	M
Write Characteristic Descriptors	M

Table 4.3: Additional GATT Sub-Procedure Requirements

C.1:   Mandatory to support at least one of these Service Discovery sub-procedures when using the LE transport. Excluded when using the BR/EDR transport since SDP must be used in this case.

C.2:   Mandatory if the Body Composition Service is supported, otherwise, not specified.

C.3:   Mandatory to support at least one of these Characteristic Discovery sub-procedures.

C.4:   Mandatory if the Collector reads UDS characteristics over LE that are UTF8 stings, otherwise optional.

C.5:   Mandatory if the writing of UDS characteristics, GAP Device Name characteristic or the Current Time characteristic is supported (see Section 3.1.3).

C.6:   Mandatory if the Collector writes UDS characteristics over LE that are UTF8 strings, otherwise optional.

4.2 Service Discovery

When using the Low Energy transport, the Collector 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.

The Collector shall discover the Weight Scale Service and shall also attempt to discover the User Data Service. The Collector may attempt to discover the Body Composition Service, Device Information Service, Battery Service, and the Current Time Service.

The Collector may perform secondary service discovery using the GATT *Find Included Services* sub-procedure to discover the Body Composition Service.

When using the BR/EDR transport, the Collector shall initiate service discovery by retrieving the SDP record of the Weight Scale Service as defined in [1].

4.3 Characteristic Discovery

As required by GATT, the Collector must be tolerant of additional optional characteristics in the service records of services used with this profile.

Where a characteristic is discovered that can be indicated or notified, the Collector shall also discover the associated *Client Characteristic Configuration* descriptor.

4.3.1   Weight Scale Service Characteristic Discovery

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

The Collector shall use the GATT *Discover All Characteristic Descriptors* sub-procedure to discover the characteristic descriptors.

The discovery requirements for the Collector are shown in Table 4.4.

Characteristic	Discovery Requirements for Collector
Weight Scale Feature	M
Weight Measurement	M

Table 4.4: Discovery Requirements for Collector

4.3.2   Body Composition Service Characteristic Discovery

The Collector may discover the characteristics of the Body Composition Service.

In order for the Collector to discover the characteristics of the Body Composition Service, it 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 this service.

If the Collector supports the Body Composition Service, the requirements for the Collector are shown in Table 4.5.

Characteristic	Discovery Requirements for Collector
Body Composition Feature	C.1
Body Composition Measurement	C.1

Table 4.5: Discovery Requirements for Collector

C.1:   Mandatory if the Body Composition Service is supported, otherwise excluded.

4.3.3   User Data Service Characteristic Discovery

If the Weight Scale exposes the User Data Service, the Collector shall discover the characteristics of the User Data Service.

In order for the Collector to discover the characteristics of the User Data Service, it 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 this service.

If the Weight Scale exposes the User Data Service, the requirements for the Collector are shown in Table 4.6.

Characteristic	Discovery Requirements for Collector
User Index	M
Database Change Increment	C.1
User Control Point	M
First Name	O
Height	O
Gender	O
Age	O
Date of Birth	O
Other UDS Characteristics	O

Table 4.6: Discovery Requirements for Collector

C.1:   Mandatory for Collectors that Write UDS Characteristics, otherwise optional.

The table above includes some common optional User Data Service characteristics in the context of the Weight Scale Profile (e.g., First Name, Height, Gender, Age and Date of Birth), but other User Data Service characteristics not listed here may also be used.

4.3.4   Device Information Service Characteristic Discovery

The Collector may discover the characteristics of the Device Information Service.

In order for the Collector to discover the characteristics of the Device Information Service, it 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 this service.

4.3.5   Battery Service Characteristic Discovery

The Collector may discover the characteristics of the Battery Service.

In order for the Collector to discover the characteristics of the Battery Service, it 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 this service.

4.3.6   Current Time Service Characteristic Discovery

The Collector may discover the characteristics of the Current Time Service.

In order for the Collector to discover the characteristics of the Current Service, it 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 this service.

4.4 Weight Scale Service Characteristics

4.4.1 Weight Scale Feature

The Collector shall read the Weight Scale Feature characteristic to determine the supported features of the Weight Scale in order to understand its capabilities.

In many cases, this will allow the Collector to adapt to the supported features of the Weight Scale (e.g., unsupported features will not be shown on the UI of the Collector). If one of the feature bits in Table 4.7 is set to 1 (meaning this feature is supported), the Collector shall assume that the related bits of the Flags field are used by the Weight Scale and the associated value might be shown on the UI of the Collector. Otherwise, it is unnecessary for the Collector to expect a value related to an unsupported feature.

Weight Scale Feature Bit(s)	Related Flag(s)
Time Stamp Supported (bit 0)	Time Stamp present (bit 1) of the Weight Measurement characteristic
Multiple Users Supported (bit 1)	User ID present (bit 2) of the Weight Measurement characteristic
BMI Supported (bit 2)	Body Mass Index (BMI) and Height present (bit 3) of the Weight Measurement characteristic
Weight Measurement Resolution (bits 3-6)	Measurement Units (bit 0) of the Weight Measurement characteristic
Height Measurement Resolution (bits 7-9)	Measurement Units (bit 0) of the Weight Measurement characteristic

Table 4.7: Weight Scale Feature Bit Requirements for Collector – Flags

If the Collector reads a Weight Scale Feature characteristic with Reserved for Future Use (RFU) bits that are non-zero, it shall ignore those bits and continue to process the Weight Scale Feature characteristic in the same way as if all the RFU bits had been zero. This is to enable compatibility with future Weight Scale Service updates.

Weight Measurement Resolution bits and Height Measurement Resolution bits (if used) can be used by Collectors that transcode data for use in an ISO/IEEE 11073 ecosystem. See the Personal Health Devices Transcoding White Paper [9] for more information.

If the Weight Scale supports indication of the Weight Scale Feature characteristic, the Collector may configure this characteristic for indications. When the collector receives an indication of the Weight Scale Feature characteristic the collector shall use the indicated value to determine the supported features again. Alternatively, the Collector may read the Weight Scale Feature characteristic each time after connecting with the Weight Scale. A Collector shall enable indications of the Weight Scale Feature characteristic, or it shall read the Weight Scale Feature characteristic on each connection.

4.4.2 Weight Measurement

The Collector shall configure indications of the Weight Measurement characteristic (i.e., via the *Client Characteristic Configuration* descriptor).

The Collector shall use the appropriate data access method defined in Section 4.11 in order to receive the indication of the Weight Measurement characteristic.

The Collector shall be able to receive multiple indications of the Weight Measurement characteristic from a Weight Scale for the case where the Weight Scale has stored measurements to send.

The Collector shall determine the contents of the Weight Measurement characteristic structure based on the contents of the Flags field. This allows the Collector to determine whether or not the optional fields are present.

The Collector shall use the Measurement Units bit of Flags field (bit 0) of the Weight Measurement characteristic to determine the unit of the Weight field (kilogram or pound), and if supported, the unit of the Height field (centimeter or inch).

If the Collector receives a Weight Measurement characteristic with Reserved for Future Use (RFU) bits of the Flags field that are non-zero, it shall ignore those bits and any additional data that may be present in the packet and continue to process the Weight Measurement characteristic in the same way as if all the RFU bits had been zero. This is to enable compatibility with future service updates for the case where available octets in the characteristic are specified for optional use. What the Collector does with the additional, unrecognized octets is left to the implementation.

The Collector shall be tolerant and behave appropriately (i.e., the Collector shall be able to continue to process commands and/or receive data normally) if receiving the special value of 0xFFFF for the Weight field (meaning 'Measurement Unsuccessful').

4.5 Body Composition Service Characteristics

4.5.1 Body Composition Feature

The Collector shall read the Body Composition Feature characteristic to determine the supported features of the Body Composition option of the Weight Scale in order to understand its capabilities.

In many cases, this will allow the Collector to adapt to the supported Body Composition option features of the Weight Scale (e.g., unsupported features will not be shown on the UI of the Collector). If one of the feature bits in Table 4.8 is set to 1 (meaning this feature is supported), the Collector shall assume that the related bits of the Flags field are used by the Weight Scale and the associated value might be shown on the UI of the Collector. Otherwise, it is unnecessary for the Collector to expect a value related to an unsupported feature.

Body Composition Feature Bit(s)	Related Flag(s)
Time Stamp Supported (bit 0)	Time Stamp present (bit 1) of the Body Composition Measurement characteristic
Multiple Users Supported (bit 1)	User ID present (bit 2) of the Body Composition Measurement characteristic
Basal Metabolism Supported (bit 2)	Basal Metabolism present (bit 3) of the Body Composition Measurement characteristic
Muscle Percentage Supported (bit 3)	Muscle Percentage present (bit 4) of the Body Composition Measurement characteristic
Muscle Mass Supported (bit 4)	Muscle Mass present (bit 5) of the Body Composition Measurement characteristic

Body Composition Feature Bit(s)	Related Flag(s)
Fat Free Mass Supported (bit 5)	Fat Free Mass present (bit 6) of the Body Composition Measurement characteristic
Soft Lean Mass Supported (bit 6)	Soft Lean Mass present (bit 7) of the Body Composition Measurement characteristic
Body Water Mass Supported (bit 7)	Body Water Mass present (bit 8) of the Body Composition Measurement characteristic
Impedance Supported (bit 8)	Impedance present (bit 9) of the Body Composition Measurement characteristic
Weight Supported (bit 9)	Weight present (bit 10) of the Body Composition Measurement characteristic
Height Supported (bit 10)	Height present (bit 11) of the Body Composition Measurement characteristic
Mass Measurement Resolution (bits 11-14)	Measurement Units (bit 0) of the Body Composition Measurement characteristic
Height Measurement Resolution (bits 15-17)	N/A (Not used with the Weight Scale Profile)

Table 4.8: Body Composition Feature Bit Requirements for Collector – Flags

If the Collector reads a Body Composition Feature characteristic with Reserved for Future Use (RFU) bits that are non-zero, it shall ignore those bits and continue to process the Body Composition Feature characteristic in the same way as if all the RFU bits had been zero. This is to enable compatibility with future Body Composition Service updates.

The Mass Measurement Resolution bits can be used by Collectors that transcode data for use in an ISO/IEEE 11073 ecosystem. The Height Measurement Resolution bits shall be set to 0b000 since the Height field of the Body Composition Service shall not be used within the context of the Weight Scale Profile. See the Personal Health Devices Transcoding White Paper [9] for more information.

4.5.2 Body Composition Measurement

The Collector shall configure indications of the Body Composition Measurement characteristic (i.e., via the *Client Characteristic Configuration* descriptor).

The Collector shall use the appropriate data access method defined in Section 4.11 in order to receive the indication of the Body Composition Measurement characteristic.

The Collector shall be able to receive multiple indications of the Body Composition Measurement characteristic from a Weight Scale for the case where the Weight Scale has stored measurements to send.

The Collector shall determine the contents of the Body Composition Measurement characteristic structure based on the contents of the Flags field. This allows the Collector to determine whether or not the optional fields are present.

The Collector shall use the Measurement Units bit of Flags field (bit 0) of the Body Composition Measurement characteristic to determine the unit of the any supported Mass (e.g., Muscle Mass, Fat Free Mass, Soft Lean Mass or Body Water Mass).

For LE implementations, the Collector shall be able to receive a Body Composition measurement that is split across two separate packet indications (the second packet is referred to as a 'continuation packet') for the case where the measurement exceeds the available space when using a default MTU size.

If the Collector receives a Body Composition Measurement characteristic with Reserved for Future Use (RFU) bits of the Flags field that are non-zero, it shall ignore those bits and any additional data that may be present in the packet and continue to process the Body Composition Measurement characteristic in the same way as if all the RFU bits had been zero. This is to enable compatibility with future service updates for the case where available octets in the characteristic are specified for optional use. What the Collector does with the additional, unrecognized, octets is left to the implementation.

The Collector shall be tolerant and behave appropriately (i.e., the Collector shall be able to continue to process commands and/or receive data normally) if receiving the special value of 0xFFFF for the Body Fat Percentage field (meaning 'Measurement Unsuccessful').

Note that the Time Stamp values of sequential indications of the Weight Measurement characteristic and Body Composition Measurement characteristic from the same user session might differ by a few seconds. This is because the measurements for weight and body composition might have been taken at slightly different times.

4.6 User Data Service Characteristics

The Collector may read and write the value of User Data Service characteristics. Note that for UDS Characteristics that may exceed the negotiated ATT_MTU size (e.g., UTF8-based characteristics), the Collector should use the GATT *Read Long Characteristic Value* and GATT *Write Long Characteristic Value* sub-procedures respectively.

Although most Collectors are expected to support the caching of User Data Service characteristic values, this is not required. Collectors that are used in a public environment (e.g., a fitness machine), will typically not cache values, but personal Collectors (e.g., mobile phone, tablet, sports watch, or computer) typically will cache values for later use for improved efficiency.

The Collector shall use the Consent procedure defined in Section 4.6.3.2.2 in order to access the UDS Characteristics exposed by the Weight Scale.

4.6.1 User Index

If the User Data Service is supported by a Weight Scale, and the Weight Scale supports multiple users (e.g., bit 1 of the Weight Scale Feature characteristic is set to 1), the Collector may read the User Index characteristic to confirm for which user the UDS characteristics are exposed before attempting to write to any UDS Characteristics.

The Collector may use the Consent procedure defined in Section 4.6.3.2.2 in order to access the UDS characteristics for the given user.

4.6.2   Database Change Increment

The Database Change Increment characteristic is used to keep track of updates to UDS Characteristics supported by both a Weight Scale and a Collector (i.e., updates made either through the UI of the Weight Scale or through the UI of a Collector).

If supported by the Weight Scale, it is optional for the Collector to configure the Database Change Increment characteristic for notifications except in the case of Collectors that support the User Data Synchronization feature, for which notifications become mandatory as specified in Section 4.6.5.

If the Collector receives a notification of the Database Change Increment characteristic, this is designed to alert the Collector that a change to at least one of the values has occurred and the Collector shall read all UDS Characteristic values that the two devices have in common.

If the Collector supports the capability to synchronize user data between devices (i.e., the User Data Synchronization feature), refer to the Database Change Increment requirements described in Section 4.6.5.

If the Collector does not support the User Data Synchronization feature, after the Collector has completed writing a new value to one or more UDS Characteristics, it shall read the Database Change Increment value from the Weight Scale, then write a value that is incremented by one to the Database Change Increment characteristic of the Weight Scale.

A rollover of the value of the Database Change Increment characteristic is extremely unlikely over the life of the device, but if it occurs, this can be handled in an implementation specific way (e.g., the implementation can ask the user to confirm the values via the UI).

4.6.3   User Control Point Characteristic

Before performing a User Control Point procedure, the Collector shall configure the User Control Point characteristic for indications (i.e., via the *Client Characteristic Configuration* descriptor).

The Collector may perform a write to the User Control Point to request a desired procedure. A procedure begins when the Collector writes a particular Op Code to the User Control Point to perform some desired action and ends when the Collector sends a confirmation to acknowledge the User Control Point indication sent by the Weight Scale at the end of the procedure. This indication includes: the Response Code, the Requested Op Code, and the Response Value and may also include a Response Parameter as defined in [5].

4.6.3.1   User Control Point Procedure Requirements

Table 4.9 shows the requirements for the User Control Point procedures (Op Codes) in the context of this profile:

Procedure (Op Code)	Requirement
Register New User	M
Consent	M
Delete User Data	M

Table 4.9: User Control Point Procedure Requirements

4.6.3.2   User Control Point Behavioral Description

The Collector shall write to the User Control Point characteristic using one of the supported Op Codes in Table 4.9 to request a Weight Scale to perform a procedure. This may include a Parameter that is valid within the context of that Op Code as defined in [5].

4.6.3.2.1   Register New User Procedure

To register a new user in the Weight Scale, the Collector shall use the *Register New User* Op Code followed by a Parameter value that represents the Consent Code defined by the user as defined in [5].

Collectors should cache the Consent Code for later use.

The Collector shall wait for the *Response Code* User Control Point Indication with the Response Value set to *Success* indicating successful operation with a Response Parameter value that represent the User Index assigned by the Weight Scale for the new user or for the procedure to time out according to the procedure time out operation described in Section 4.6.3.3. When the procedure is successful, the Weight Scale will return a *Response Code* containing the User Index.

See Section 4.10 for general error handling procedures.

4.6.3.2.2   Consent Procedure

To request the consent of a Weight Scale user in order to access their UDS Characteristics, the Collector shall use the *Consent* Op Code followed by an array of 3 UINT8 Parameter Values that represents the User Index (1 octet) followed by the Consent Code (2 octets) defined by the user as defined in [5].

The Collector shall wait for the *Response Code* User Control Point Indication with the Response Value set to *Success* indicating successful operation or an error response value as described in Section 4.10, or for the procedure to time out according to the procedure time out operation described in Section 4.6.3.3.

See Section 4.10 for general error handling procedures.

4.6.3.2.3   Delete User Data Procedure

To request the deletion of the UDS Characteristics of the Weight Scale, the Collector shall use the *Delete User Data* procedure.

The Collector shall wait for the *Response Code* User Control Point Indication with the Response Value set to *Success*, indicating successful operation, or for the procedure to time out according to the procedure time out operation described in Section 4.6.3.3.

The Collector shall initiate the appropriate user consent procedure as defined in 4.11 in order to delete the user data exposed by the Weight Scale.

See Section 4.10 for general error handling procedures.

4.6.3.3   Procedure Timeout

In the context of the User Control Point characteristic, a procedure is started when the Collector writes a particular Op Code to the User Control Point to perform some desired action. A procedure ends when the Collector sends a confirmation to acknowledge the User Control Point indication sent by the Weight Scale with the Op Code set to *Response Code*.

In the context of the User Control Point characteristic, a procedure is not considered started and not queued in the Weight Scale when a write to the User Control Point results in an ATT Error Response.

A procedure is considered to have timed out if a User Control Point indication is not received within the ATT transaction timeout, defined as 30 seconds in Volume 2 Part F Section 3.3.3 of [2], from the start of the procedure.

If the link is lost while a User Control Point procedure is in progress then the procedure shall be considered to have timed out.

Thus, a Collector shall start a timer with the value set to the ATT transaction timeout after the write response is received from the Weight Scale. The timer shall be stopped when a User Control Point indication is received and the Op Code is set to *Response Code*. If the timer expires, then the procedure shall be considered to have failed.

If a User Control Point procedure times out, then no new User Control Point procedure shall be started by the Collector until a new link is established with the Weight Scale. To ensure a good user experience, if a User Control Point procedure times out, the Collector should disconnect and then reconnect.

4.6.4   Other User Data Service Characteristics

If the Collector supports remote updating of user data to the Weight Scale (e.g., First Name, Height, Gender, Age, or Date of Birth values), it shall support reading and writing to the corresponding User Data Service characteristics as defined in [3].

4.6.5   User Data Synchronization Feature

The User Data Synchronization feature is optional. If supported, the requirements in this section apply.

When a connection is established, the Collector shall read the Database Change Increment characteristic value and compare it to its local (cached) value. Based on the comparison between these two values, the Collector shall perform the appropriate action defined in the Table 4.10. After the synchronization procedure is completed, both the Collector and the Weight Scale will have the same UDS Characteristic and Database Change Increment values.

Condition	Action Requirement
Database Change Increment values are equal in both the Collector and the Weight Scale.	The databases are synchronized and do not require any action by the Collector.
Database Change Increment value of the Weight Scale is greater than the value in the Collector (i.e., the user data at the Weight Scale are more recent)	The Collector shall read and cache all the UDS characteristics supported by the Collector. The Collector shall also cache the Database Change Increment value for future use.
Database Change Increment value of the Weight Scale is less than the value in the Collector (i.e., the user data at the Collector are more recent)	The Collector shall write updated UDS characteristics to the Weight Scale. After the user data are updated, the Collector shall also write its local Database Change Increment value to the Weight Scale in order to complete the synchronization procedure.

Table 4.10: User Data Synchronization Feature Action Requirements.

If notifications of the Database Change Increment characteristic are supported by the Weight Scale, the Collector shall configure it for notifications.

When the Collector updates the cached UDS Characteristics while not in a connection (e.g., through its UI), it shall increment by one the value of the cached Database Change Increment characteristic. This is to synchronize the UDS Characteristics values with the Weight Scale at the next connection.

When a Collector that supports the update of UDS Characteristics (e.g., through its UI) is connected to a Weight Scale and when the Collector updates one or more UDS Characteristics values exposed by the Weight Scale, the Collector shall increment its local Database Change Increment value by one and write the incremented value of the Database Change Increment characteristic to the Weight Scale.

4.7 Device Information Service Characteristics

The Collector may read the value of Device Information Service characteristics.

4.8 Battery Service Characteristics

The Collector may read the value of the Battery Level characteristic. If the Weight Scale supports the notification of the Battery Level characteristic, the Collector may also configure this characteristic for notification (e.g., via the Client Characteristic Configuration descriptor).

4.9 Current Time Service Characteristics

If the Current Time Service is supported, the Collector may read, write and notify the value of the Current Time characteristic.

If the Weight Scale supports the notification of the Current Time characteristic, the Collector may also configure this characteristic for notification (e.g., via the Client Characteristic Configuration descriptor).

If supported by the Weight Scale, the Collector may read the Current Time characteristic to determine the current time and date of the Weight Scale. This allows the Collector to verify the accuracy of the Weight Scale's time base relative to its own. What a Collector does if it detects an inaccuracy is left to the implementation.

4.10 General Error Handling

The Collector shall be tolerant and behave appropriately (i.e., the Collector shall be able to continue to process commands and/or receive data normally) when receiving the following Control Point Error codes defined in the User Data Service [5]:

- Op Code Not Supported

- Invalid Parameter

- Operation Failed

- User Not Authorized

The Collector shall also be tolerant and behave appropriately (i.e., the Collector shall be able to continue to process commands and/or receive data normally) when receiving the following Application ATT Error Code defined in the User Data Service [5]:

- User Data Access Not Permitted

The Collector shall also be tolerant and behave appropriately (i.e., the Collector shall be able to continue to process commands and/or receive data normally) when receiving the following ATT Error Codes:

- Procedure Already In Progress

- Client Characteristic Configuration Descriptor Improperly Configured

4.11 Data Access Methods

The Collector shall be able to use both data access methods (i.e., Bond-based and User Control Point-based) to receive the measurement data (i.e., Weight Measurement and/or Body Composition Measurement indications) and to access the UDS Characteristics.

Weight Scale Configuration	Data Access Method for Receiving Measurement Data	Data Access Method for UDS Characteristics
Single-user, No UDS	Bond-based	N/A
Single-user, UDS	Bond-based	User Control Point based
Multi-user, UDS	User Control Point based	User Control Point based

Table 4.11: Data Access Methods

The Collector shall use the Consent procedure defined in Section 4.6.3.2.2 in order to authorize the Collector to access the UDS Characteristics.

The appropriate Data Access method shall be used by the Collector in order to receive the measurement data (i.e., indication of the Weight Measurement and/or Body Composition Measurement).

5 Connection Establishment Procedures

This section describes the connection establishment and connection termination procedures used by a Weight Scale and Collector in typical scenarios.

5.1 Weight Scale Connection Establishment for Low Energy Transport

This section describes connection procedures that a Weight Scale should follow to initiate a connection with a Collector using an LE transport.

- Section 5.1.1 describes the connection procedure when the Weight Scale does not support bonding, or if the Weight Scale supports bonding, but is not bonded with any Collectors.

- Section 5.1.2 describes the connection procedure when the Weight Scale is bonded with one or more Collectors.

- Section 5.1.3 is used when the established connection is broken after a link loss and a reconnection is required.

5.1.1 Connection Procedure for Unbonded Devices

This procedure is used for connection establishment when the Weight Scale is not bonded with any Collectors and ready for connection (e.g., when the Weight Scale has data to send or when commanded by the user).

If a connection is not established within 30 seconds, the Weight Scale may either continue sending background advertising to reduce power consumption as long as it chooses or stop advertising. The advertising interval and time to perform advertising are implementation specific and should be configured with consideration for user expectations of connection establishment time using the GAP timers defined in Volume 3, Part C, Section 9.3.11 **Error! Reference source not found.**.

If a connection is not established within a time limit defined by the Weight Scale, the Weight Scale may exit the GAP Connectable Mode.

The table below summarizes the recommended procedure if the Weight Scale is not bonded to any Collectors.

Recommended GAP Modes	Recommended Filter Policy	Remarks
General or Limited Discoverable Modes Undirected Connectable Mode Bondable Mode	Attempt to connect to any Collectors.	

Table 5.1: Recommended Connection Procedure for Unbonded Devices

When a bond is created, refer to recommendations in Section 5.1.2.

When the Weight Scale no longer requires a connection, it should perform the GAP *Terminate Connection* procedure.

If the Weight Scale has no data to transfer (or no further data to transfer) and the connection is idle, the Weight Scale should wait at least longer than the maximum connection interval (e.g., 5 seconds) before performing the GAP Terminate Connection procedure. This allows the Collector to perform any additional required actions (e.g., read the Weight Scale Feature characteristic or read and write to UDS characteristics). For devices that support Man in the Middle (MITM) protection, this duration may need to be longer to allow completion of the pairing sequence.

5.1.2   Connection Procedure for Bonded Devices

This table below summarizes the recommended procedure if the Weight Scale is bonded with one or more Collectors.

Recommended Time	Recommended GAP Modes	Recommended Filter Policy	Remarks
First 10 seconds	Non-Discoverable Mode Undirected Connectable Mode	Attempt to connect to only bonded Collectors in Filter Accept List.	The Filter Accept List should be used in order to accept connection requests only from the relevant bonded Collector.
After 10 seconds	General or Limited Discoverable Modes Undirected Connectable Mode Bondable Mode	Attempt to connect to any Collectors.	This allows bonding with a new Collector. Unbonded procedure is described in Section 5.1.1.

Table 5.2: Recommended Connection Procedure for Bonded Devices

If a Weight Scale requires a connection to a Collector that did not use a resolvable private address during bonding, it may use Low Duty Cycle Directed Advertisements in order to advertise to only the Collector for which it has data. However, it is usually not possible in practice to use Directed Advertising to connect to Collectors because many require the use of resolvable private addresses. Therefore, when a Collector used a resolvable private address during bonding and the Weight Scale requires a connection to that Collector, the Weight Scale should use the Undirected Connectable Mode along with the Service Data AD Type described in Section 3.1.5 to reduce unwanted connection requests.

If a connection is not established within 30 seconds, the Weight Scale may either continue sending background advertising to reduce power consumption as long as it chooses, or stop advertising.

The advertising interval and time to perform advertising are implementation specific and should be configured with consideration for user expectations of connection establishment time using the GAP timers defined in Volume 3, Part C, Section 9.3.11 [2].

If a connection is not established within a time limit defined by the Weight Scale, the Weight Scale may exit the GAP Connectable Mode.

When the Weight Scale is disconnected and the Weight Scale is ready for reconnection (e.g., when the Weight Scale has new data to send or when commanded by the user), the Weight Scale should reinitiate the connection procedure (e.g., start advertising).

If the Weight Scale has no data to transfer (or no further data to transfer) and the connection is idle, the Weight Scale should wait 5 seconds (idle connection timeout) before performing the GAP Terminate Connection procedure. This allows the Collector to perform any additional required actions (e.g., read the Weight Scale Feature characteristic or read and write to UDS characteristics). For devices that support Man in the Middle (MITM) protection, this duration may need to be longer to allow completion of the pairing sequence.

5.1.3   Link Loss Reconnection Procedure

When a connection is terminated due to link loss, the Weight Scale should attempt to reconnect to the Collector by entering a GAP Connectable Mode.

5.1.4   Use of Service Data AD Type

This section outlines an optional procedure that is applicable when a Weight Scale uses the Undirected Connectable Mode and the Service Data AD Type.

The Service Data AD Type described in Section 3.1.5 provides a mechanism to reduce unwanted connection requests by unintended Collectors when Undirected Connectable Mode is used and when a Weight Scale has new indications to send. Refer also to Section 5.2.2 for the procedure from the Collector perspective.

When a Weight Scale uses undirected connectable advertisements, it should include the Service Data AD Type in its Advertising Data. The value of the User ID List field of the Service Data AD Type shall be populated with one or more User IDs for which the Weight Scale has measurements. This allows each Collector to determine if the Weight Scale has any new pending indications since the last time the Collector read the User ID List field.

5.2 Collector Connection Establishment for Low Energy Transport

This section describes connection procedures a Collector should follow to initiate a connection with a Weight Scale using an LE transport.

The Collector should use the GAP General Discovery procedure to discover a Weight Scale. If a Collector uses the GAP Limited Discovery procedure it will only be able to detect Weight Scales that are in the GAP Limited Discoverable Mode.

A Collector may use one of the GAP Connection procedures based on its connectivity requirements as described in Table 5.3:

GAP Connection Procedure	Unbonded Collector	Bonded Collector
General Connection Establishment	Allowed	Allowed
Direct Connection Establishment	Allowed	Allowed
Auto Connection Establishment	Not Allowed	Allowed
Selective Connection Establishment	Not Allowed	Allowed

Table 5.3: Allowed GAP Connection Procedure

If a connection is not established within 30 Seconds, the Collector may either continue background scanning to reduce power consumption or stop scanning.

The connection interval, scan interval, scan window, and time to perform scanning are implementation specific and should be configured with consideration for user expectations of connection establishment time using the GAP timers defined in Volume 3, Part C, Section 9.3.11 [2].

If a connection is not established within a time limit defined by the Collector, the Collector may exit the connection establishment procedure.

When the connection is established, the Collector shall bond with the Weight Scale.

Upon initial connection, the Collector may initiate the Register New User procedure defined in Section 4.6.3.2.1 and may configure the new user data by writing to UDS Characteristics.

The Collector should terminate the connection when the measurement session is terminated at the Collector by the user.

When the Collector is disconnected, the Collector may continue scanning for advertisements from Weight Scales and may initiate a new connection.

5.2.1 Link Loss Reconnection Procedure

When a connection is terminated due to link loss, the Collector should attempt to reconnect to the Weight Scale using any of the GAP Connection procedures using the connection establishment timing parameters defined in Vol. 3, Part C (GAP) section 9.3.11 [2] and the connection interval timing parameters defined in Vol. 3, Part C (GAP) section 9.3.12 [2].

5.2.2 Use of Service Data AD Type

This section outlines an optional procedure that is applicable when a Collector supports the use of the Service Data AD Type for the Weight Scale Service.

The Service Data AD Type described in Section 3.1.5 provides a mechanism to reduce unwanted connection requests by unintended Collectors when Undirected Connectable Mode is used and when a Weight Scale has new indications to send. Refer to Section 5.1.4 for the procedure from the Weight Scale perspective.

When a Collector receives an undirected connectable advertisement from a Weight Scale that includes the Service Data AD Type in its Advertising Data, the Collector shall read the User ID List field of the Service Data AD Type to determine if a new indication is pending since the last time it read the User ID List field. If the value of one of the User IDs in the User ID List field matches the value assigned to that Collector, the Collector should attempt to connect to the Weight Scale to receive any measurements.

5.3 Connection Establishment for BR/EDR

This section describes the connection establishment and connection termination procedures used by a Weight Scale and Collector using a BR/EDR transport. Unlike the LE Connection procedures, which describe specific connection parameters, BR/EDR connection establishment does not state requirements beyond those described in GAP based on potential interactions with other BR/EDR profiles operating concurrently on the Weight Scale and/or Collector.

When using BR/EDR, devices can utilize sniff mode and sniff subrating to reduce power consumption; however no particular parameters are recommended and the requirements of other profiles may need to be considered.

5.3.1   Connection Procedure

The procedures for establishing a connection between a Weight Scale and Collector that do not have an existing bond and for re-establishing a connection between bonded devices use the inquiry, discovery, paging, pairing and security procedures described in Generic Access Profile of the Core Specification [2] and any additional GAP requirements enumerated in Sections 4.9 and 7.

5.3.1.1   Connection Procedure for Unbonded Devices

The Weight Scale shall use either the GAP General or Limited Discoverable Mode when it is not bonded with any Collectors and is ready for a connection (e.g., when the Weight Scale has data to send or when commanded by the user).

The Collector should use the GAP General Inquiry procedure to discover a Weight Scale to establish a connection to a Weight Scale to which it is not bonded. If a Collector uses the GAP Limited Inquiry procedure, it will only be able to detect Weight Scales that are in the GAP Limited Discoverable Mode.

Either the Weight Scale or the Collector can establish a BR/EDR link to a remote peer device.

Once a link is established, the Collector shall discover the Weight Scale Service using SDP procedures prior to establishing a GATT connection.

Once the Weight Scale Service is discovered and a GATT connection is established, the Collector shall discover the Weight Scale Service characteristics exposed by this service using GATT Discovery procedures.

Once connected, the Collector shall configure any Weight Scale Service or Body Composition Service characteristics that require indications.

The Collector should terminate the connection when the measurement session is terminated at the Collector by the user.

When the Weight Scale no longer has data to send, it may disconnect the link, depending on the use cases of the devices and other profiles connected on either device.

5.3.1.2   Connection Procedure for Bonded Devices

The Weight Scale shall use the GAP Link Establishment Procedure to connect to any bonded Collectors when it is ready for a connection (e.g., when the Weight Scale has data to send or when commanded by the user).

The Collector shall be Connectable to accept a connection from a Weight Scale to which it is bonded.

Either the Weight Scale or the Collector can establish a BR/EDR link to a remote peer device.

Upon initial connection, the Collector may initiate the Register New User procedure defined in Section 4.6.3.2.1 and may configure the new user data by writing to UDS Characteristics.

If a higher layer determines the bond no longer exists on the remote device, the local device must reconfigure the remote device after:

- user interaction confirms that the user wants to re-pair with the remote device,

- re-bonding has been performed, and

- service discovery has been performed. (If the local device had previously determined that the remote device did not have the «Service Changed» characteristic, then service discovery may be skipped because the service is not allowed to change per the Core Specification.)

When the Weight Scale no longer has data to send, it may disconnect the link, depending on the use cases of the devices and other profiles connected on either device.

The Collector should terminate the connection when the measurement session is terminated at the Collector by the user.

When the Weight Scale is disconnected and it is ready for reconnection (e.g., when the Weight Scale has new data to send when commanded by the user), the Weight Scale should initiate a connection with the Collector.

If the Weight Scale has no data to transfer (or no further data to transfer) and the connection is idle, the Weight Scale should wait 5 seconds (idle connection timeout) before performing the GAP Terminate Connection procedure. This allows the Collector to perform any additional required actions (e.g., read the Weight Scale Feature characteristic or read and write to UDS characteristics). For devices that support Man in the Middle (MITM) protection, this duration may need to be longer to allow completion of the pairing sequence.

5.3.2 Link Loss Reconnection Procedure

When a connection is terminated due to link loss, a Weight Scale should reconnect to the Collector by attempting, for an implementation-specific time, to reestablish an ACL link between the two devices. The Collector should remain Connectable for an implementation-specific time so that a Weight Scale can reestablish an ACL link.

6 Security Considerations

This section describes the security considerations for a Weight Scale and Collector.

6.1 Weight Scale Security Considerations for Low Energy

This section describes the security requirements for the Weight Scale for an LE transport.

- All supported characteristics specified by the Weight Scale Service shall be set to LE Security Mode 1 and Security Level 2 or higher.

- If used, all characteristics exposed by the User Data Service for use by this profile should be set the same security mode and level as the characteristics in the Weight Scale Service.

- If used, all characteristics exposed by the Body Composition Service, and the Device Information Service for use by this profile should be set to the same security mode and level as the characteristics in the Weight Scale Service.

- If present and writable, the Device Name descriptor should support Authentication.

6.2 Collector Security Considerations for Low Energy

This section describes the security requirements for the Collector for an LE transport.

- The Collector shall support bonding in case it is requested by the Weight Scale.

- The Collector shall accept any request by the Weight Scale for LE Security Mode 1 and Security Level 2 or higher.

6.3 Security Considerations for BR/EDR

As required by GAP, Security Mode 4 (service level enforced security) shall be used for connections by the Weight Scale and Collector.

- The Weight Scale may initiate Dedicated Bonding with the Collector, however, if the Weight Scale supports multiple users, then it shall initiate Dedicated Bonding and shall support as many bonds as the number of supported users.

- The Collector shall support bonding in case it is requested by the Weight Scale.

7   Generic Access Profile for BR/EDR

This section defines the support requirements for the capabilities as defined in the Generic Access Profile of the Core Specification [2] when BR/EDR is used.

7.1 Modes

The Mode Procedures as defined in GAP describe requirements for both Weight Scale and Collectors. This profile further refines the requirements.

- At least the General Discoverable Mode or the Limited Discoverable Mode shall be supported by Weight Scales.

- Bondable Mode should be supported by Weight Scales and shall be supported by Collectors.

Table 7.1 shows the support status for GAP Modes in this profile.

Modes	Support in Weight Scale	Support in Collector
General Discoverable Mode	C.1	N/A
Limited Discoverable Mode	C.1	N/A
Bondable Mode	O	M

Table 7.1:Modes

C.1:   It is mandatory to support at least one of these modes.

7.2 Idle Mode Procedures

The Idle Mode Procedures as defined in GAP describe requirements for both Weight Scale and Collectors involved. This profile further refines the requirements.

- General Inquiry shall be supported by all Collectors.

- Limited Inquiry may be supported by Collectors.

- General Bonding should be supported by all Weight Scales and shall be supported by Collectors.

Table 7.2 shows the support status for Idle Mode procedures within this profile.

Procedure	Support in Weight Scale	Support in Collector
General Inquiry	N/A	M
Limited Inquiry	N/A	O
General Bonding	O	M

Table 7.2: Idle Mode Procedures

8   Acronyms and Abbreviations

Acronyms and Abbreviations	Meaning
ACL	Asynchronous Connection-oriented [logical transport]
AD	Advertising Data
AMP	Alternate MAC/PHY
ASCII	American Standard Code for Information Interchange
BCS	Body Composition
BMI	Body Mass Index
BR/EDR	Basic Rate / Enhanced Data Rate
DIS	Device Information Service
IEEE	Institute of Electrical and Electronics Engineers
ISO	International Standards Organization
GAP	Generic Access Profile
GATT	Generic Attribute Profile
LE	Low Energy
MITM	Man In The Middle
MTU	Maximum Transmission Unit
RFU	Reserved for Future Use
SDP	Service Discovery Protocol
SM	Security Manager
UDS	User Data Service
UI	User Interface
UTF	Unicode Transformation Format
UUID	Universally Unique Identifier
WSS	Weight Scale Service

Table 8.1: Acronyms and Abbreviations

9   References

[1]   Weight Scale Service

[2]   Bluetooth Core Specification v4.2 or later

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

[4]   Body Composition Service v1.0 or later

[5]   User Data Service v1.0 or later

[6]   Device Information Service v1.1 or later

[7]   Battery Service v1.0 or later

[8]   Current Time Service v1.1 or later

[9]   Personal Health Devices Transcoding White Paper v1.5 or later

[10] ISO/IEEE Std 11073-20601™- 2008 Health Informatics - Personal Health Device Communication - Application Profile - Optimized Exchange Protocol - version 1.0 or later. This also includes ISO/IEEE Std 11073-20601a™- 2010 – Amendment 1.