

Environmental Sensing Service (ESS)

Bluetooth® Implementation Conformance Statement (ICS) Proforma

- **Revision:** ESS.ICS.p4 edition 2
- **Revision Date:** 2025-03-14
- **Prepared By:** BTI
- **Published during TCRL:** TCRL.2024-2-addition



This document, regardless of its title or content, is not a Bluetooth Specification as defined in the Bluetooth Patent/Copyright License Agreement (“PCLA”) and Bluetooth Trademark License Agreement. Use of this document by members of Bluetooth SIG is governed by the membership and other related agreements between Bluetooth SIG Inc. (“Bluetooth SIG”) and its members, including the PCLA and other agreements posted on Bluetooth SIG’s website located at www.bluetooth.com.

THIS DOCUMENT IS PROVIDED “AS IS” AND BLUETOOTH SIG, ITS MEMBERS, AND THEIR AFFILIATES MAKE NO REPRESENTATIONS OR WARRANTIES AND DISCLAIM ALL WARRANTIES, EXPRESS OR IMPLIED, INCLUDING ANY WARRANTY OF MERCHANTABILITY, TITLE, NON-INFRINGEMENT, FITNESS FOR ANY PARTICULAR PURPOSE, THAT THE CONTENT OF THIS DOCUMENT IS FREE OF ERRORS.

TO THE EXTENT NOT PROHIBITED BY LAW, BLUETOOTH SIG, ITS MEMBERS, AND THEIR AFFILIATES DISCLAIM ALL LIABILITY ARISING OUT OF OR RELATING TO USE OF THIS DOCUMENT AND ANY INFORMATION CONTAINED IN THIS DOCUMENT, INCLUDING LOST REVENUE, PROFITS, DATA OR PROGRAMS, OR BUSINESS INTERRUPTION, OR FOR SPECIAL, INDIRECT, CONSEQUENTIAL, INCIDENTAL OR PUNITIVE DAMAGES, HOWEVER CAUSED AND REGARDLESS OF THE THEORY OF LIABILITY, AND EVEN IF BLUETOOTH SIG, ITS MEMBERS, OR THEIR AFFILIATES HAVE BEEN ADVISED OF THE POSSIBILITY OF SUCH DAMAGES.

This document is proprietary to Bluetooth SIG. This document may contain or cover subject matter that is intellectual property of Bluetooth SIG and its members. The furnishing of this document does not grant any license to any intellectual property of Bluetooth SIG or its members.

This document is subject to change without notice.

Copyright © 2014–2025 by Bluetooth SIG, Inc. The Bluetooth word mark and logos are owned by Bluetooth SIG, Inc. Other third-party brands and names are the property of their respective owners.



Contents

1	General principles	4
1.1	Implementation Under Test (IUT) identification	4
1.2	Enforcement of inter-layer dependencies	4
2	ICS declarations	5
2.1	Versions	5
2.2	Transports	5
2.3	Service requirements	5
2.4	Characteristic requirements	6
2.5	Characteristic Feature requirements	7
2.6	GATT requirements	7
2.7	SDP requirements.....	8
3	References	9
4	Revision history and acknowledgments	10

1 General principles

1.1 Implementation Under Test (IUT) identification

Using the Bluetooth SIG qualification tool, the implementer is expected to declare details about what will be implemented.

1.2 Enforcement of inter-layer dependencies

This ICS includes one or more tables with inter-layer dependencies (ILDs). ILDs are used for specification requirements that are dependent on other supporting specifications. ILDs can refer to an individual ICS item in a separate layer (individual ILD), or it can refer to the full layer (full-layer ILD).

ILDs residing in an X2Core layer will be enforced from the Bluetooth SIG qualification tool in the following conditions, depending on where the referred ILD is residing:

Referred ILD resides in	Individual ILD	Full-layer ILD
Controller layer	Core-Complete configuration, or Referred layer is supported	N/A
Lower HCI layer	HCI is supported	N/A
Upper HCI layer	Core-Host configuration, or UHCI is supported	N/A
Host layer	Core-Host configuration, or Core-Complete configuration, or Referred layer is supported	N/A
X2Core layer	Core-Host configuration, or Core-Complete configuration, or Referred layer is supported	Core-Host configuration, or Core-Complete configuration

Table 1.1: Enforcement of an ILD within the Bluetooth SIG qualification tool

2 ICS declarations

2.1 Versions

Table 0: X.Y Versions

Item	Version	Reference	Status
1	ESS v1.0	[1]	M

Table 0a: X.Y.Z Versions

Item	Version	Reference	Status
1	ESS v1.0.1	[5]	O

Table 1: No longer used

2.2 Transports

Table 2: Transport Requirements

Item	Transport	Reference	Status
1	Service supported over BR/EDR	[1] 1.5	C.1, C.3
2	Service supported over LE	[1] 1.5	C.2, C.3

C.1: Excluded for this Service IF CORE 41/2 “LE Core Configuration”.

C.2: Excluded for this Service IF CORE 41/1 “BR/EDR Core Configuration”.

C.3: Mandatory to support at least one.

2.3 Service requirements

Table 3: Feature Requirements

Item	Capability	Reference	Status
1	Multiple Instances of same ESS Characteristic UUID	[1] 3.1, 3.2.1	O

Table 4: ESS Characteristics

Item	ESS Characteristic	Reference	Status
1	Elevation	[1] 3.1, [3], [4]	O
2	Pressure	[1] 3.1, [3], [4]	O
3	Temperature	[1] 3.1, [3], [4]	O
4	Humidity	[1] 3.1, [3], [4]	O
5	True Wind Speed	[1] 3.1, [3], [4]	O
6	True Wind Direction	[1] 3.1, [3], [4]	O
7	Apparent Wind Speed	[1] 3.1, [3], [4]	O
8	Apparent Wind Direction	[1] 3.1, [3], [4]	O



Item	ESS Characteristic	Reference	Status
9	Gust Factor	[1] 3.1, [3], [4]	O
10	Pollen Concentration	[1] 3.1, [3], [4]	O
11	UV Index	[1] 3.1, [3], [4]	O
12	Irradiance	[1] 3.1, [3], [4]	O
13	Rainfall	[1] 3.1, [3], [4]	O
14	Wind Chill	[1] 3.1, [3], [4]	O
15	Heat Index	[1] 3.1, [3], [4]	O
16	Dew Point	[1] 3.1, [3], [4]	O
17	Barometric Pressure Trend	[1] 3.1, [3], [4]	O
18	Magnetic Declination	[1] 3.1, [3], [4]	O
19	Magnetic Flux Density - 2D	[1] 3.1, [3], [4]	O
20	Magnetic Flux Density - 3D	[1] 3.1, [3], [4]	O

2.4 Characteristic requirements

Table 5: Properties of the ESS Characteristic

Item	Capability	Reference	Status
1	Read	[1] 3	M
2	Notify	[1] 3	O
3	Extended Properties	[1] 3.1.2.4.1	C.1

C.1: Mandatory IF ESS 6/9 “Characteristic User Description descriptor is writable”, otherwise Excluded.

Table 6: Characteristic Descriptors of the ESS Characteristic

Item	Capability	Reference	Status
1	ES Measurement descriptor	[1] 3.1.2.1	C.1
2	ES Trigger Setting descriptor (first instance)	[1] 3.1.2.2	C.2
3	ES Trigger Setting descriptor (second instance)	[1] 3.1.2.2	C.3
4	ES Trigger Setting descriptor (third instance)	[1] 3.1.2.2	C.4
5	ES Trigger Setting descriptors are writable	[1] 3.1.2.2	C.3
6	ES Configuration descriptor	[1] 3.1.2.3	C.6
7	ES Configuration descriptor is writable	[1] 3.1.2.3	C.5
8	Characteristic User Description descriptor	[1] 3.1.2.4	O
9	Characteristic User Description descriptor is writable	[1] 3.1.2.4	C.7
10	Characteristic User Description descriptor string length may exceed the capacity of the default ATT_MTU	[1] 3.1.2.4, 1.4	C.7
11	Valid Range descriptor	[1] 3.1.2.5	O
12	Characteristic Extended Properties descriptor	[1] 3.1.2.4.1	C.8

C.1: Mandatory IF ESS 3/1 “Multiple Instances of same ESS Characteristic UUID”, otherwise Optional.

C.2: Mandatory IF ESS 5/2 “Notify”, otherwise Excluded.



- C.3: Optional IF ESS 6/2 “ES Trigger Setting descriptor (first instance)”, otherwise Excluded.
- C.4: Optional IF ESS 6/3 “ES Trigger Setting descriptor (second instance)”, otherwise Excluded.
- C.5: Optional IF ESS 6/5 “ES Trigger Setting descriptors are writable”, otherwise Excluded.
- C.6: Mandatory IF ESS 6/3 “ES Trigger Setting descriptor (second instance)”, otherwise Excluded.
- C.7: Optional IF ESS 6/8 “Characteristic User Description descriptor”, otherwise Excluded.
- C.8: Mandatory IF ESS 6/9 “Characteristic User Description descriptor is writable”, otherwise Excluded.

Table 7: Features of Characteristic Descriptors of the ESS Characteristic

Item	Capability	Reference	Status
1	A change to the value of the ES Measurement Descriptor may occur on the Server	[1] 3.1.2, 3.2.1	C.1
2	A change to value of an ES Trigger Setting Descriptor on the Server may occur on the Server	[1] 3.1.2, 3.2.1	C.2
3	A change to the value of the ES Configuration Descriptor may occur on the Server	[1] 3.2	C.3
4	A change to the value of the Characteristic User Description Descriptor may occur on the Server	[1] 3.2	C.4

- C.1: Optional IF ESS 6/1 “ES Measurement descriptor”, otherwise Excluded.
- C.2: Optional IF ESS 6/2 “ES Trigger Setting descriptor (first instance)”, otherwise Excluded.
- C.3: Optional IF ESS 6/6 “ES Configuration descriptor”, otherwise Excluded.
- C.4: Optional IF ESS 6/8 “Characteristic User Description descriptor”, otherwise Excluded.

2.5 Characteristic Feature requirements

Table 8: Characteristic Feature Requirements

Item	Capability	Reference	Status
1	Descriptor Value Changed Characteristic	[1] 3.1	C.1
2	Notification to Multiple Bonded Clients	[1] 3.1.2.3.1	C.2

- C.1: Mandatory IF ESS 6/9 “Characteristic User Description descriptor is writable” OR ESS 7/1 “A change to the value of the ES Measurement Descriptor may occur on the Server” OR ESS 7/2 “A change to value of an ES Trigger Setting Descriptor on the Server may occur on the Server” OR ESS 7/3 “A change to the value of the ES Configuration Descriptor may occur on the Server” OR ESS 7/4 “A change to the value of the Characteristic User Description Descriptor may occur on the Server”, otherwise Excluded.
- C.2: Optional IF ESS 5/2 “Notify”, otherwise Excluded.

2.6 GATT requirements

Table 9: GATT Requirements

Item	Capability	Reference	Status	Inter-Layer Dependency
1	No longer used	N/A	N/A	N/A
1a	GATT Server over BR/EDR	[1] 1.4	C.6	[2] GATT 1a/4
1b	GATT Server over LE	[1] 1.4	C.7	[2] GATT 1a/3
2	Single Notification	[1] 1.4	C.1	[2] GATT 4/17



Item	Capability	Reference	Status	Inter-Layer Dependency
3	Indications	[1] 1.4	C.2	[2] GATT 4/18
4	Read Characteristic Descriptors	[1] 1.4	M	[2] GATT 4/19
5	Write Characteristic Descriptors	[1] 1.4	C.3	[2] GATT 4/21
6	Read Long Characteristic Descriptors	[1] 1.4	C.4	[2] GATT 4/20
7	Write Long Characteristic Descriptors	[1] 1.4	C.5	[2] GATT 4/22

- C.1: Mandatory IF ESS 5/2 “Notify”, otherwise not defined.
- C.2: Mandatory IF ESS 8/1 “Descriptor Value Changed Characteristic”, otherwise Optional.
- C.3: Mandatory IF ESS 8/1 “Descriptor Value Changed Characteristic” OR ESS 9/2 “Single Notification” OR ESS 6/9 “Characteristic User Description descriptor is writable” OR ESS 6/2 “ES Trigger Setting descriptor (first instance)” OR ESS 6/6 “ES Configuration descriptor”, otherwise Optional.
- C.4: Mandatory IF ESS 6/8 “Characteristic User Description descriptor” AND ESS 6/10 “Characteristic User Description descriptor string length may exceed the capacity of the default ATT_MTU”, otherwise Optional.
- C.5: Mandatory IF ESS 6/9 “Characteristic User Description descriptor is writable” AND ESS 6/10 “Characteristic User Description descriptor string length may exceed the capacity of the default ATT_MTU”, otherwise Optional.
- C.6: Mandatory IF ESS 2/1 “Service supported over BR/EDR”, otherwise not defined.
- C.7: Mandatory IF ESS 2/2 “Service supported over LE”, otherwise not defined.

2.7 SDP requirements

Table 10: SDP Requirements

Prerequisite: ESS 2/1 “Service supported over BR/EDR”

Item	Capability	Reference	Status
1	SDP record present for ESS	N/A	M

3 References

- [1] Environmental Sensing Service Specification, Version 1.0 or later
- [2] ICS Proforma for Generic Attribute Profile (GATT)
- [3] Permitted Characteristics (<https://www.bluetooth.com/specifications/assigned-numbers>)
- [4] GATT Specification Supplement (<https://www.bluetooth.com/specifications/assigned-numbers>)
- [5] Environmental Sensing Service Specification, Version 1.0.1

4 Revision history and acknowledgments

Revision History

Publication Number	Revision Number	Date	Comments
0	1.0.0	2014-11-25	Prepare for Publication.
	1.0.1r00	2016-10-05	TSE 7515: GAP 0/3 added to Table 2; References [3], [4], and [5] – v4.0.n support restrictions removed
1	1.0.1	2016-12-13	Approved by BTI. Prepared for TCRL 2016-2 publication.
	1.0.1 edition 2r00	2018-11-21	Editorial changes only. Template updated. Revision History and Contributors tables moved to the end of the document.
	1.0.1 edition 2	2019-12-03	Updated copyright page and confidentiality markings to support new Documentation Marking Requirements, performed minor formatting updates, and accepted all tracked changes to prepare for edition 2 publication.
	p2r00–r03	2022-03-23 – 2022-05-04	TSE 18585 (rating 2): Updated C.5 of Table 6 and C.5 of Table 9, and the status for item 5 of Table 6. TSE 18671 (rating 1): Deleted Table 1 because the Core Specification version table is no longer used. TSE 18717 (rating 1): Editorials to align the document with the latest ICS template in anticipation of a .Z release. Editorials, including assigning publication number 1 to previous v1.0.1, consistency checker fixes, and aligning the copyright page with v2 of the DNMD.
2	p2	2022-06-28	Approved by BTI on 2022-05-31. Prepared for TCRL 2022-1 publication.
	p3r00–r01	2022-10-28 – 2022-11-14	TSE 19191 (rating 1): In Table 4, added references to the Permitted Characteristics document and the GATT Specification Supplement. Updated the references list.
3	p3	2023-02-07	Approved by BTI on 2022-12-28. Prepared for TCRL 2022-2 publication.
	p4r00–r02	2024-08-01 – 2024-08-20	TSE 25576 (rating 1): Per E16259, E16260, E16607, and E18749, added new X.Y.Z version as part of the .Z release. Added a reference for Environmental Sensing Service Specification, Version 1.0.1. Performed template-related and other formatting fixes.
4	p4	2024-10-08	Approved by BTI on 2024-09-11. ESS v1.0.1 adopted by the BoD on 2024-10-01. Prepared for TCRL 2024-2-addition publication.
	p4ed2r00	2025-02-11	TSE 27073 (rating 1): Updated Table 2 status values and conditional C.1; added C.2 and C.3. Updated 9/1 to indicate it is no longer used. Added 9/1a and 9/1b. Updated 9/2. Updated Table 9 C.3 and added C.6 and C.7. Applied the latest ICS template.
	p4 edition 2	2025-03-14	Approved by BTI on 2025-03-11. Prepared for edition 2 publication.

Acknowledgments

Name	Company
Laurence Richardson	Cambridge Silicon Radio
Tatsuo Arai	Casio
Robert Hughes	Intel
Guillaume Schatz	Polar Electro Oy